CHAPTER 3
AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter documents the existing conditions and trends of resources in the planning area that may be affected by implementing any of the proposed alternatives described in **Chapter 2**. The affected environment provides the context for assessing potential impacts as described in **Chapter 4**, Environmental Consequences.

For this RMPA/EIS, the planning area is the entire Oregon Sub-region (31,756,507 acres), which is east of the Cascade Mountains, and contains BLM-administered lands and other lands. Within the Oregon Sub-region planning area, there are 12,618,026 acres of BLM-administered surface lands and 2,639,000 acres of BLM-administered mineral split-estate beneath private surface lands. This totals 15,257,026 acres, which comprises the decision area. The planning area encompasses two WAFWA Sage-Grouse Management Zones: Snake River Plain (MZ IV) and Northern Great Basin.

3.1.1 Organization of Chapter 3

Each resource section in this chapter contains a discussion of background information, including guidance and regulations, and current conditions. Existing conditions describe the location, extent, and current condition of the resource in the planning area in general and on BLM-administered lands. Conditions for a resource can vary, depending on the resource. Those resources that have a greater influence on GRSG populations and habitat and that are more likely to be affected by GRSG management actions are described in greater detail than those resources that have little to no influence. Those resources that have a greater influence are GRSG, vegetation, wild horse and burro, wildland fire management, livestock grazing/range management, travel management, lands and realty, and energy and mineral resources.

Depending on the resource, a general description of the existing conditions may be provided for the Oregon Sub-region planning area, regardless of land status. This is done to provide a regional context for the resource. Also, a more detailed description of the existing conditions may be provided for the decision area according to the BLM plans being amended by this RMPA/EIS. This is done to provide an area-specific description of the existing conditions for the resource. When possible, greater emphasis is placed on describing the existing conditions of the resource as it pertains to GRSG and their habitat.

The following resources and resource programs are not present; do not have specific GRSG conservation goals, objectives, or management actions identified in the alternatives; or are not directly affected by the alternatives presented in this RMPA/EIS:

- Air Quality
- Paleontology
- Visual Resources
- Cave and Karst Resources
- Coal
- Public Health and Safety

Although coal/strip mining is a threat to GRSG and their habitat for the general Great Basin region, these activities do not historically or currently occur in the Oregon sub-region. Within the sub-region, there are no known BLM-administered lands that contain economic deposits of coal, and there are no existing or historic, surface or subsurface coal mines in the sub-region. There are no lands designated as unsuitable for surface mining, in accordance with 43 CFR Part 1610.7-1, relative to implementing the Surface Mining Control and Reclamation Area of 1977. This is because economic deposits of this solid mineral are not known to be present in the sub-region.

Trends identify the degree and direction of resource change between the present and some point in the past. If there is change, the degree and direction of resource change is characterized as moving toward or away from the current condition based on the indicators, and the reasons for the change are identified where known. Trends can also be described in quantitative or qualitative terms. Identifying the trends is done to provide an understanding of how BLM management influences the desired condition of the resource over time. It can be difficult to analyze trends for certain resources, because changes to the resource often occur due to factors beyond the control of the BLM.

The BLM reviewed the RMPs being amended under this RMPA/EIS and other relevant information sources (such as RMP amendments, maps, and state GRSG conservation assessments) for existing conditions and trends for the resources

described in this chapter with respect to GRSG and their habitat. This affected environment information is summarized in the following sections and, where appropriate, noted when the information is incorporated by reference.

Data from GIS have been used in developing acreage calculations and for generating many of the figures. Calculations in this EIS are rounded and are dependent upon the quality and availability of data. Data were collected from a variety of sources, including the BLM, collaborative partners, stakeholders, and cooperating agencies. Given the scale of the statewide analysis, the compatibility constraints between datasets, and lack of data for some resources, all calculations are approximate and serve for comparison and analytic purposes only. Likewise, the figures are provided for illustrative purposes and subject to the limitations discussed above. Detailed, site-specific information is available from local BLM offices. The BLM may receive additional geographic information systems data; therefore, the acreages may be recalculated and revised at a later date.

3.2 GREATER SAGE-GROUSE AND SAGE-GROUSE HABITAT

The GRSG is a federal candidate species for listing under the ESA, an Oregon BLM sensitive species, and an ODFW vulnerable species.

3.2.1 Existing Conditions

Conditions of the Planning Area

Greater Sage-Grouse

Availability of Sagebrush Habitat

The planning area encompasses two WAFWA Sage-Grouse Management Zones: Snake River Plain (MZ IV) and Northern Great Basin (MZ V; Stiver et al. 2006). There are approximately 13.7 and 5.1 million acres of preliminary priority habitat (PPH) in MZs IV and V, and 4.9 and 4.2 million acres of preliminary general habitat (PGH) in MZs IV and V, respectively.

Garton et al. (2011) identified five GRSG populations in Oregon, and two of these are managed by at least three states (**Figure 3-1**, Geographic Sub-Division of Five Greater Sage-Grouse Populations in Oregon and Shared Populations Among Adjacent States). Oregon's two largest GRSG populations are in southeast Oregon. BLM regions and WAFWA management zones represent broad-scale habitat analyses, while Population Areas represent mid-scale GRSG habitat.

The relatively large Northern Great Basin population (minimum population estimate of 9,114 males in 2007; Garton et al. 2011) occupies portions of Oregon, Nevada, Idaho, and Utah and is separated from adjacent populations by distance (12 to 37 miles) and topography. The Western Great Basin population

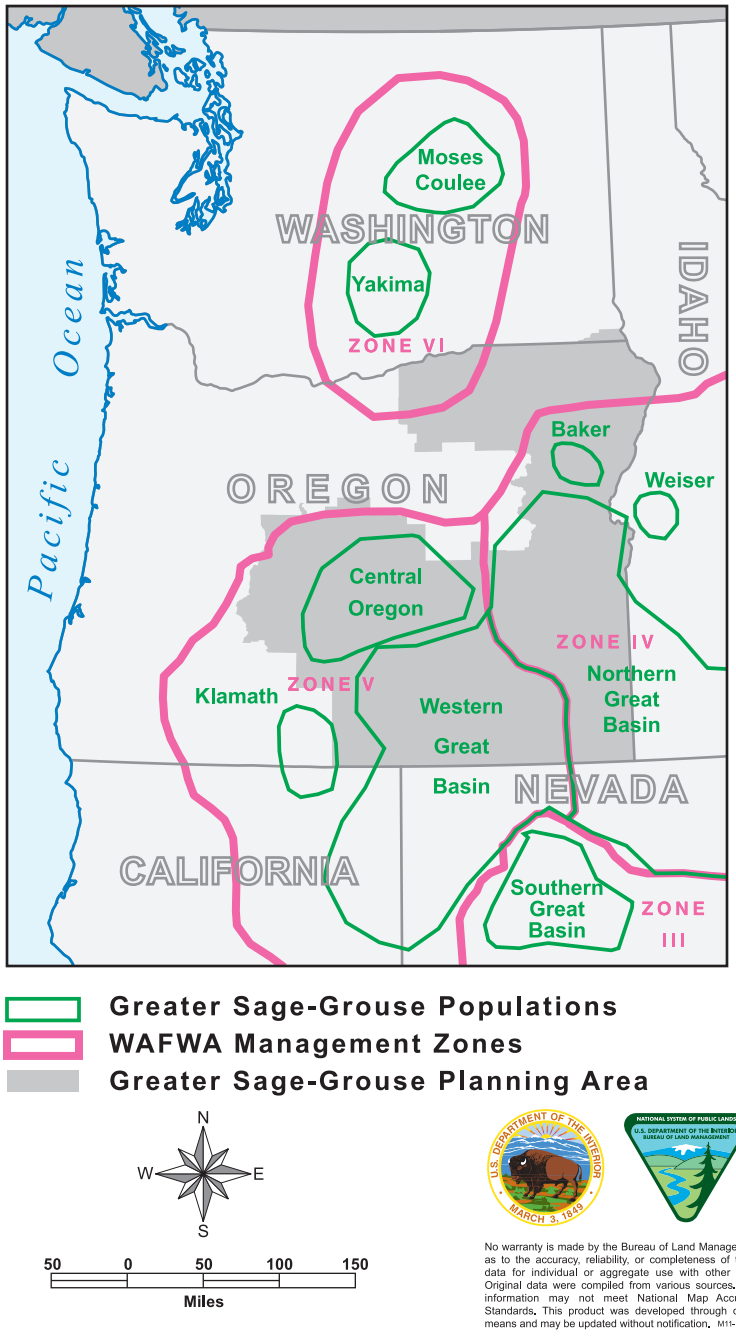

Figure 3-1: Geographic Sub-Division of Five Greater Sage-Grouse Populations in Oregon and Shared Populations Among Adjacent States

(minimum population estimate of 5,904 males in 2007; Garton et al. 2011) in southeast Oregon, northwest Nevada, and northeast California is separated from adjacent populations by distance (approximately 16 miles) and unsuitable habitat. The Klamath Falls population in southwest Oregon had few birds at leks into the early 1990s, and no sightings have been confirmed since 1993 despite periodic survey efforts (Hagen 2011). The Baker population in northeast Oregon (minimum estimated spring population of 872 to 1,650 birds in 2010; Hagen 2011) appears to be separated by topography and unsuitable habitat from the nearest population in Weiser, Idaho, by approximately 20 miles. Inter-seasonal movements of a radio-marked female sage-grouse between its spring/summer range east of Keating, Oregon, and winter locations northwest of Weiser, Idaho, (distance approximately 33 miles) indicate some connection of the Baker population with adjacent populations (USFWS 2013a). Additional leks have been found in the Baker area in the last few years as result of surveys for a proposed transmission line project. The Central Oregon population has a minimum population estimate of 835 males in 2007 (Garton et al. 2011) and is separated by topography from adjacent populations (i.e., Western Great Basin and Northern Great Basin) and distance (approximately 19 miles).

The distribution of GRSG is closely aligned with the distribution of sagebrush-dominated landscapes (Schroeder et al. 2004). GRSG require large, intact and connected expanses of sagebrush shrubland to exist (Aldridge et al. 2008; Wisdom et al. 2011). Sagebrush habitat in south-central Oregon and the Owyhee region of southeast Oregon is among the largest and most contiguous found within the current range of GRSG. The overarching habitat goal established by ODFW (Hagen 2011) is to maintain or enhance the current range and distribution of sagebrush habitats in Oregon. To meet this goal, the conservation focus for ODFW is to retain at least 70 percent of sage-grouse range as sagebrush habitat in advanced structural stages, sagebrush Classes 3, 4, or 5, with an emphasis on Classes 4 and 5. The remaining 30 percent could include areas of juniper encroachment, non-sage-brush shrubland, and grassland (either from natural or anthropogenic disturbance) that potentially can be enhanced or restored. The "70/30" goal is used in the affected environment to invoke additional actions if the split is exceeded. The ODFW has endorsed the actions/objectives associated with the 70/30 split. The 70/30 split was based on a multi-scale habitat assessment developed by the BLM in southeastern Oregon (Karl and Sadowski 2005) and has been used in most eastern Oregon RMPs published since 2000 for all habitat. However, other authors (Aldridge et al. 2008; Doherty et al. 2010; Wisdom et al. 2011) report a higher proportion of sagebrush cover (50 to 70 percent) within priority habitat is required for long-term sage-grouse persistence.

In Oregon, the BLM developed its PPH/PGH map (see **Figure 2-1**) based in large part on the ODFW Sage-Grouse Core Areas Map. All Core Area habitat was classified as PPH, and all Low Density habitat area was classified as PGH. ODFW does not include all currently occupied GRSG habitat in its Low Density

habitat layer[1] as modeled by Durtsche et al. (2010), though it is included in in its Mitigation Framework. The BLM added these areas (approximately 1.7 million acres of BLM-administered lands) to its PGH layer.

ODFW identified Core Areas (Doherty et al. 2011b) for GRSG that conserve most of Oregon's population with emphasis on areas with the highest density and most important for breeding and wintering and may serve as connectivity corridors (Hagen 2011). While the radius of Core Areas may differ around leks, numerous studies have shown that on average, 80 percent of nests are within 4 miles of a lek adding to the importance of the Core Areas for breeding and early brood-rearing purposes (Doherty et al. 2011b). Due to the nature of the available data, no correlation of distance or condition assessment was undertaken for the proximity to leks. Core Areas in Oregon encompass approximately 90 percent of the breeding populations of GRSG on 38 percent of the species' range. However, not all lek locations are known and some occur outside of the Core Areas.

Average maximum counts of lekking male GRSG were used to identify four lek density strata (percent of breeding population): very high (25 percent), high (50 percent), moderate (75 percent), and low (100 percent). Lek density strata, winter habitat use areas, and connectivity corridors were integrated to classify GRSG habitat into one of two categories: Core Area and Low Density. Core Area habitat consists of all sagebrush types or other habitats that support GRSG that are encompassed by areas of very high, high, and moderate lek density strata; where low lek density strata overlap local connectivity corridors; or where known winter habitat-use polygons overlap with either low lek density strata, connectivity corridors, or occupied habitat. Low Density area encompasses the remainder. Of the 3,397 breeding season locations of radio-telemetry birds, 95 percent occur in Core Area habitat and the remaining 5 percent occur in Low Density habitat (Hagen 2011). Of the 663 summer locations, 89 percent occur in Core Area habitat and the remaining 5 percent occur in Low Density habitat. Of the 1,695 winter locations, 99 percent occur in Core Area habitat, and the remaining 1 percent occurs in Low Density habitat.[2] Core Area and Low Density habitat comprise approximately 7.1 and 6.2 million acres, respectively (Hagen 2011). After local implementation team refinement of the Core and Low Density maps, 6.5 and 5.2 million acres remain in Core and Low Density habitat, respectively (Budeau 2012). Approximately 67 percent of Core Area habitat and 68 percent of Low Density habitat occur on BLM-administered lands (**Figure 2-1**).

[1] One percent of breeding and 6 percent of summer radio-telemetry locations of sage-grouse in Oregon are outside of Core Area and Low Density habitat, respectively (Hagen 2011). Not all leks have been found.
[2] Some sage-grouse nests recently have been found in Low Density habitat suggesting these percent occupancy rates may be elevated. Forty-eight percent of the radio telemetry outfitted birds in one study area in the Warner Range in 2012 nested in Low Density habitat, because a lek discovered in Spring 2010 was not included in the ODFW Core Area analysis.

IM 2012-044 directs the BLM to collaborate with state wildlife agencies to identify and map two categories of GRSG habitat:

- Preliminary Priority Habitat (PPH): Areas that have been identified as having the highest conservation value to maintaining sustainable GRSG populations. These areas would include breeding, late brood-rearing, and winter concentration areas, and
- Preliminary General Habitat (PGH): Areas of occupied seasonal or year-round habitat outside of priority habitat.

There are approximately 14.8 million acres of GRSG habitat in Oregon, including 6.5 million acres classified as PPH and 8.2 million acres classified as PGH (**Table 3-1**, Acres of PPH and PGH on BLM-Administered and Non-BLM Lands in Oregon). Non-BLM-administered land includes tribal, state, other federal, county, and private lands. The BLM administers 10.2 million acres or 69 percent of this habitat area. Burns, Lakeview, and Vale BLM Districts each support 70 percent or more of the available GRSG habitat in these areas (see **Figure 3-2**, Bureau of Land Management Districts in the Planning Area). On the Prineville District, the BLM administers approximately 48 percent of available GRSG habitat.

Table 3-1
Acres of PPH and PGH on BLM-Administered and Non-BLM Lands in Oregon

BLM District	PPH Acres		PGH Acres		Total Acres
	BLM	Other	BLM	Other	
Burns	976,100	333,200	1,992,100	957,200	4,258,600
Lakeview	975,200	408,800	1,359,600	401,700	3,145,200
Prineville	329,600	391,900	300,300	271,300	1,293,200
Vale	2,266,100	886,100	2,010,700	960,500	6,123,400
Total	4,547,000	2,020,000	5,662,700	2,590,700	14,820,400

Source: Oregon/Washington BLM 2013

Table 3-2, Acres of GRSG Population Areas on BLM-Administered Lands in Oregon, shows the acreage of PPMA and PGMA on BLM-administered land in each GRSG population area in Oregon, along with the percentage of the GRSG population area found in each area.

Connectivity of Habitat Patches

While the amount of habitat available to GRSG is very important, habitat pattern and quality is just as critical to long-term survival of the species. Fragmentation of habitat into smaller patches can result in extirpation of local GRSG populations when functional connectivity among patches is lost. Leks separated by distances greater than 11 miles could be isolated due to decreased

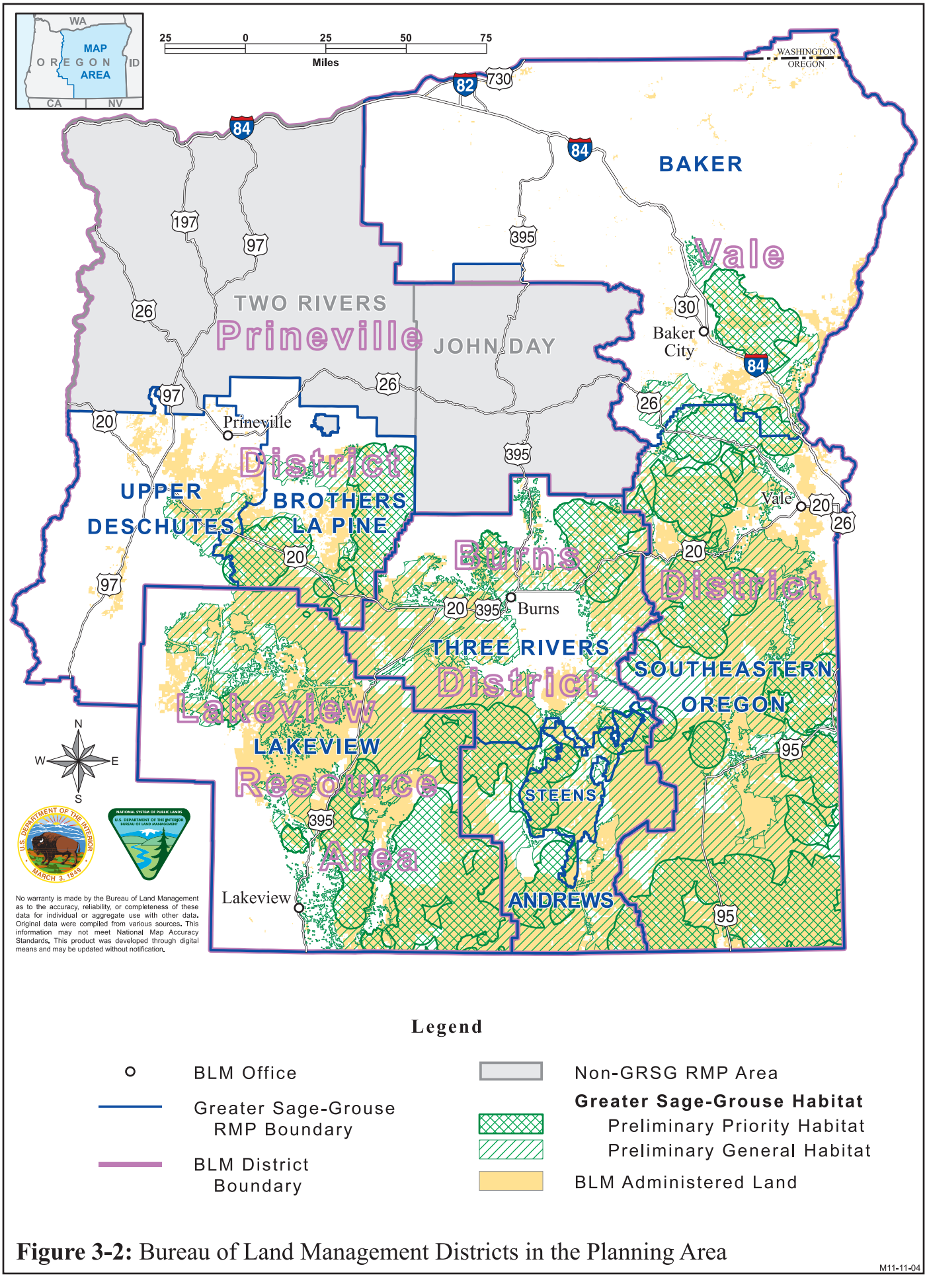

Figure 3-2: Bureau of Land Management Districts in the Planning Area

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Table 3-2
Acres of GRSG Population Areas on BLM-Administered Lands in Oregon

WAFWA Management Zone	Population	PPMA on BLM lands	PGMA on BLM lands	Non-Habitat on BLM lands	Total Occupied (PPMA & PGMA)
MZ IV	Area outside GRSG population	12,163 (<1%)	31,542 (<1%)	147,155	43,705 (<1%)
MZ V	Area outside GRSG population	26,031 (1%)	312,772 (1%)	510,333	338,803 (3%)
MZ IV	**Baker OR**	100,532 (2%)	3,406 (<1%)	2,715	103,938 (1%)
MZ V	**Central OR**	372,093 (8%)	1,253,780 (22%)	435,829	1,625,873 (16%)
MZ IV	**Northern Great Basin**	2,138,699 (47%)	1,909,731 (34%)	615,688	4,048,430 (40%)
MZ V	**Western Great Basin**	1,897,503 (42%)	2,151,398 (38%)	683,651	4,048,901 (40%)

Source: Oregon/Washington BLM 2013

probability of dispersals from neighboring leks (Connelly et al. 2000a). Isolation and reduced connectivity increases the probability of loss of genetic diversity and extirpation from stochastic events (Knick and Hanser 2011).

There is little information available regarding minimum sagebrush patch sizes required to support populations of GRSG. This is due in part to the migratory nature of some but not all GRSG populations, the lack of connectivity between seasonal habitats, and differences in local, regional, and range-wide ecological conditions that influence the distribution of sagebrush and associated understories. Where home ranges have been reported, they are extremely variable (1.5 to 238 square miles; Connelly et al. 2011a). Investigations from Idaho and Wyoming suggest that relatively large blocks of sagebrush habitat (more than 9,900 acres) are critical to successful reproduction and over-winter survival (Leonard et al. 2000; Walker et al. 2007). Occupancy of a home range is also based on multiple variables associated with both local vegetation characteristics and landscape characteristics (Knick et al. 2003). Pyke (2011) estimated that greater than 9,884 acres (4,000 hectares) was necessary for population sustainability; however, Pyke did not indicate whether this value was for migratory or non-migratory populations, or if this included juxtaposition of all seasonal habitats. Large seasonal and annual movements emphasize the large landscapes required by the GRSG (Knick et al. 2003; Connelly et al. 2011a).

GRSG populations may be nonmigratory or migratory, moving between or among seasonal use areas (Connelly et al. 2011a). GRSG in Oregon generally exhibit one-stage migratory behavior with the largest movements (10 miles) occurring between breeding and summer habitats, which corresponds with

elevational movements in mountains (Hagen 2011). Movements between summer and winter habitats (3 to 9 miles) were generally directed toward breeding areas, although GRSG may travel considerable distances (over 19 miles) in severe winters to find food and cover (USFWS 2013a).

The ODFW used a GIS-based connectivity model (Hagen 2011) to evaluate the fragmentation of existing GRSG habitat patches in Oregon. The average maximum extent of connectivity between breeding and surrounding seasonal-use areas was 10 miles, which is similar to the range-wide average (Knick and Connelly 2011). Habitat capability was defined and ranked from most to least capable of supporting GRSG on a scale of 1 to 4, respectively, based on 160-acre units. Within each 160-acre unit, the dominant overstory cover type (over 50 percent) determined the overall viability. Areas of intact sagebrush cover had high viability; habitats that are potentially useful to GRSG but the extent of which is unknown had moderate viability; and habitats that have potential to transition from a disturbance (natural or human-caused) to sagebrush had low viability. Habitats that had been converted to agriculture or urban land uses, and natural features, such as bare ground or rock cliffs, had negligible viability. Roads, power lines, and urban or rural industrial developments downgrade otherwise viable habitat for GRSG (i.e., from viable to negligible viability). Model output resulted in maps (Hagen 2011) that depict areas of vulnerable and intact habitats across the state (broad-scale) and for each BLM district boundary (mid-scale). The connectivity model classified 9.2 million acres in Oregon as largely connected high viability blocks of habitat, although the suitability of understory vegetation for GRSG of most of these acres is unknown. It is important to understand that connectivity maps do not describe the habitat condition with respect to understory structure and composition of habitat blocks. Identifying these factors (through monitoring) will be important to management.

An assessment of habitat connectivity using only those high viability habitat blocks that were greater than 2,500 acres identified several areas of contiguous habitat. However, within the 2 largest areas, encompassing over 6 million acres, several locations have small corridors and, thus, limited connectivity (Hagen 2011). Both human-caused and natural barriers in Burns District BLM separate these two contiguous areas. From the statewide scale, it is evident that connectivity is limited between GRSG in the Baker Resource Area and northern Malheur County.

Landscape Matrix and Edge Effect

GRSG typically occupy sagebrush vegetation but may also use a variety of other habitats (e.g., riparian meadows, agricultural lands) intermixed in a sagebrush-dominated landscape. In Idaho, sagebrush patches adjacent to large, abrupt patches of grass or forb-dominated habitat (usually burned areas or crested wheatgrass seedings) received much less use on their periphery than more interspersed sagebrush patches (Shepard 2006). Aldridge and Boyce (2007) found GRSG selected large expanses of sagebrush and avoided anthropogenic

edge during the breeding season. Thus, the viability of fragmented habitat for GRSG is dependent upon the juxtaposition of these habitats in relation to sagebrush and the hazards to birds using these areas (Connelly et al. 2011b).

Wildfire and prescribed fire can cause loss of habitat and, as a result, fire has been identified as a primary factor associated with GRSG population declines (USFWS 2010). GRSG typically select nest sites in herbaceous understory, resulting in loss of nesting habitat following wildfire or prescribed fire. However, it is important to distinguish between sagebrush communities in xeric versus higher-elevation mesic sites (Miller et al. 2011). Restoration and maintenance of sagebrush-steppe communities in higher elevation mesic sites using prescribed fire may be necessary to maintain sage-grouse habitat by reducing juniper encroachment. Habitat restoration and maintenance treatments should be designed for site-specific benefits, and, when properly implemented, can help protect GRSG habitat from large, high severity wildfires.

Juniper encroachment affects over 12 million acres in the Great Basin alone (Miller et al. 2008). A decline of shrubs is the most documented shift in understory vegetation following western juniper encroachment. Conifer encroachment fragments sagebrush habitat for sage-grouse both by removing suitable cover and by providing tall structures that attract predators of sage-grouse such as corvids (Doherty et al. 2008, 2010). Mountain big sagebrush sites show 20 to 25 percent declines in shrub cover in response to trees reaching 50 percent of the maximum site potential (Miller et al. 2000). Corvid abundances have been positively correlated with higher nest predation rates of many birds, including GRSG (Hagen 2011).

Anthropogenic Disturbances

Comparing environmental conditions and levels of human disturbance on areas of former range (extirpated range) with areas still occupied by GRSG (occupied range), Wisdom et al. (2011) identified five key factors most likely to lead to extirpation of local populations: sagebrush area, elevation, distance to transmission lines, distance to cellular towers, and land ownership (See *Availability of Sagebrush Habitat* for more information about sagebrush). Land ownership was a surrogate for conversion of private lands to non-sagebrush land uses that have reduced habitat availability and fragmented remaining sagebrush habitat nearby. Lek abandonment was most likely to occur in areas with over 25 percent cultivated cropland within 18 miles of the lek (Aldridge et al. 2008). Transmission lines, in addition to reducing habitat suitability and increasing fragmentation, can cause GRSG mortality through bird collisions with lines and facilitate raptor predation of GRSG. Transmission structures and communication towers may also provide nesting sites for corvids and raptors in habitats with low vegetation and relatively flat terrain (Ellis 1984; Steenhof et al. 1993; Johnson et al. 2011). Lek count trends tend to be lower on leks within three miles of interstate highways (Johnson et al. 2011) but no apparent relationship has been found between lek count trends and the presence of

secondary roads (Aldridge et al. 2008). Generally, road-effect distances (the distance from a road at which a population density decrease is detected) are positively correlated with increased traffic density and speed (Foreman and Alexander 1998). Rates of decline in sage-grouse male lek attendance increased as traffic volumes on roads near leks increased, and vehicle activity on roads during the daily strutting period (that is, early morning) had a greater influence on male lek attendance compared with roads with no vehicle activity during early morning in southwestern Wyoming (Holloran 2005). Generally, oil and gas developments within two to four miles of leks or nesting areas had deleterious effect on populations, with the impacts increasing with increasing well density (Lyon and Anderson 2003; Walker et al. 2007; Johnson et al. 2011). Knick and Connelly (2011) found that fire and human disturbance were the primary factors influencing fate of leks. Knick et al. (2003) reported 95 percent of active leks (3,184 leks) in their western states study area were in landscapes with less than 3 percent development; all lands surrounding leks were less than 14 percent developed.

Conditions on BLM-Administered Lands

Greater Sage-Grouse

Burns District. The GRSG population in the Burns District, based on counts at 126 lek complexes over the last 30 years has experienced two large increases and two subsequent declines, and a fluctuating but slightly increasing trend from 1980 to 2010 (Hagen 2011). Since 1981, population size has fluctuated around 4,300 birds, which is the population goal (based on the Spring 2003 breeding population) that ODFW has set for the region. Most of the sagebrush habitat is within the Northern Great Basin MZ. Maintenance of currently available habitat amounts and quality should sustain this population level (Hagen 2011). However, there is potential for the Burns District population to be influenced by management south and east of Oregon in the Western Great Basin and Northern Great Basin MZs.

While there is a large amount of GRSG habitat in the Burns District (4.2 million acres; **Table 3-1**) including significant amounts of PPH (1.3 million acres), both human-caused and natural barriers separate the 2 largest contiguous areas of habitat and may impact the ability of GRSG to disperse between populations. Areas of PGH between large areas of PPH form habitat corridors that link priority habitat areas on the Burns District with GRSG habitat on the Lakeview, Prineville, and Vale Districts (**Figure 2-1**). In the ODFW habitat viability analysis (Hagen 2011), sagebrush habitat was found to comprise 68 percent of the district, most of which (80 percent) was ranked as high viability. According to Hagen (2011), "reasonable habitat connectivity exists in this district as evidenced by the inclusion of over half of the two largest contiguous areas of sagebrush in the state." However, GRSG habitat north of Highway 20 between Hines and Hampton is heavily impacted by juniper encroachment. Higher elevation areas in the Steens Mountain region are also being encroached by

juniper. Fire has affected approximately 373,000 acres (240,000 acres in 2012) of most highly viable habitat (i.e., PPH) in the Burns District. Emergency stabilization and rehabilitation plans outline reestablishment of sagebrush in these important habitats.

Prineville District. The Central Oregon population is encompassed within the eastern portion of the Prineville District. The Prineville GRSG population, based on counts at 58 lek complexes over the last 30 years, is estimated at approximately 2,000 birds and has declined steadily; the trend is the most sustained of all BLM districts (Hagen 2011). The causes for population declines are unknown but could be related to lack of genetic diversity, population isolation, land-use practices, recreation activities, and urban development. Because the Prineville District is at the northern edge of GRSG range, connectivity in this region is especially important. The ODFW plan for GRSG (Hagen 2011) seeks to restore populations and distributions near the 1980 spring breeding population level (approximately 3,000 birds) through maintaining or increasing the amount of currently available habitat and increase habitat quality (enhancement and restoration). The ODFW habitat viability analysis reported 67 percent of the Prineville District was in sagebrush cover, and 74 percent of that was high viability habitat (Hagen 2011). The Prineville District has the smallest amount of GRSG habitat (1.3 million acres) of any BLM district in eastern Oregon (**Table 3-1**). The BLM manages approximately 49 percent (629,938 acres) of PPH/PGH in the district. The primary habitat block where GRSG occur is contiguous with the area shared by the Lakeview and Burns Districts. The habitat is concentrated in the southeastern edge of the district forming 2 relatively large patches of PPH. Juniper encroachment (320,000 acres) is a significant concern for approximately 30 percent of this habitat area. Human impacts from anthropogenic structures (e.g., power lines, OHV trails, and residential developments) and recreational activities (e.g., mountain biking, bird watching, horseback riding) are also a concern. Hagen (2011) postulated that the cumulative effects of these disturbances are among the main factors limiting this population. Slightly more than 1,000 acres of high viability habitat in the Prineville District area have been impacted by wildfire since 2004.

Lakeview District. Almost all of the Lakeview District falls into the Western Great Basin GRSG population. GRSG population trends on the Lakeview District have fluctuated widely with peaks in 1989 and 2006 and lows in 1996 and 2007. As of 2010, the average number of males observed per lek (15.8) has returned to near the 1996 low (14). Since 1981, population size has fluctuated around 9,400 birds, which is the population goal (based on the Spring 2003 breeding population) that ODFW has set for the region. Maintenance of currently available habitat amounts and quality is assumed to be sufficient to sustain this population level (Hagen 2011). However, there is potential for population trends to be influenced by management outside of Oregon.

Approximately 598,000 acres of GRSG habitat has been lost on the Lakeview District since the late 1800s, representing a 17 percent decline in habitat availability. The ODFW habitat viability analysis reported 67 percent of the Lakeview District was comprised of sagebrush cover, and 92 percent of that was high viability habitat (Hagen 2011). The BLM manages 2.3 million acres (74 percent) of the 3.1 million acres of PPH/PGH mapped in this region. Connectivity is high with the most contiguous patch of sagebrush in the state extending from the Nevada border to north of Highway 20. According to Hagen (2011), "Christmas Valley and the area north of Summer Lake are highly susceptible to future isolation given the relatively narrow corridor of habitat connecting them with the larger habitat areas." Much of this corridor is mapped as PGH.

Vale District. The BLM administers 4.2 million acres (70 percent) of the 6.1 million acres of PPH/PGH mapped in this region. There are large contiguous habitat patches in this region, although there also are large disturbed areas resulting from crested wheatgrass seeding projects done in the 1960s. Sagebrush areas lost to wildfire (337,750 acres) and seedings (148,243 acres) are the largest in Oregon. Sagebrush habitat east of Baker City is relatively isolated from other habitat blocks. The area near Interstate 84 may serve as a migratory or dispersal corridor.

The number of counted males per active lek in Baker County has remained relatively stable since systematic lek surveys began in 1989 and is estimated at approximately 1,500 birds. Maintenance of currently available habitat amounts and quality is assumed to be sufficient to sustain a 2003 population size (approximately 2,000 birds) and distribution into the future (Hagen 2011). However, it is unknown if there is movement (dispersal) of birds from habitat east of Interstate 84 to habitats in the southwest portion of Baker County. The ODFW assumes that populations east of Interstate 84 are closed to immigration or emigration (i.e., "closed populations"), and those near Malheur County are open populations (i.e., population size is regulated in part by immigration from populations North of Harper). A telemetry study involving 63 sage-grouse in Baker County during 2009-2012 found no evidence of dispersal into Malheur County. Most birds occupied relatively small ranges during spring and summer months, but showed large movements to winter habitat. Several birds moved approximately 16 kilometers southwest to the Virtue Flat area for winter. One female moved out of the study area to winter in southwest Idaho (distance of 33 miles) and returned to Oregon in spring (USFWS 2013a). However, recent evidence of birds moving from Keating Valley and Virtue Flat regions indicates seasonal migrations into Idaho.

Population trends for the remainder of Vale District (excluding Baker) have fluctuated around the 2003 estimate for the region (approximately 11,000 birds; Hagen 2011). It is likely that populations were significantly larger prior to the extensive sagebrush removal program of the 1960s. As the treatment areas are

recolonized by sagebrush, they will assist in maintaining local populations. Fire has altered over 800,000 acres of sagebrush in Vale District since 2004 (Hagen 2011; BLM 2012e). During the record-setting 2012 fire season, the Long Draw fire burned over 557,000 acres in the Vale District, and the Holloway fire burned an estimated 225,000 acres in the Burns and Vale Districts. The extent to which management practices designed to maintain and restore sagebrush habitat would influence shared populations with Idaho and Nevada is unknown.

The BLM's objective is to maintain or increase current populations and manage or restore priority areas so that at least 70 percent of the land cover provides adequate sagebrush habitat to meet sage-grouse needs (70/30 objective).

In Oregon, the amount of sagebrush cover is close to the 70/30 objective when considering shrub cover. The ODFW's model estimates that the statewide sagebrush disturbance proportion is currently near the objective of 70/30. The ODFW approach used GIS and satellite imagery as well as the Southwest, Northwest GAP models and LANDFIRE. The ODFW approach accounts for sagebrush cover, but not the understory. The amount of sagebrush cover can be measured to some degree through remote sensing but the composition of the understory cannot. On the 10.2 million acres of GRSG habitat that the BLM administers in Oregon (of the 14.8 million total acres in Oregon), the BLM is currently near the 70/30 objective, although the percentage of sagebrush and disturbed habitats varies within each district. **Table 3-3**, ODFW Estimated Percent Sagebrush Cover by District, shows the current estimated percent sagebrush cover by district.

Table 3-3
ODFW Estimated Percent Sagebrush Cover by District[1]

BLM District	Sagebrush Cover	Disturbed Cover
Baker Resource Area	82% sagebrush	18% disturbed habitats
Vale District (excluding Baker Resource Area)	70% sagebrush	30% disturbed habitats
Burns District	68% sagebrush	32% disturbed habitats
Lakeview District	72% sagebrush	28% disturbed habitats
Prineville District	47% sagebrush	53% disturbed habitats

Source: Oregon/Washington BLM 2013
[1]Since the ODFW calculations, wildfire affected approximately 373,000 acres in the Burns District and 337,750 acres in the Vale District in 2012.
http://www.dfw.state.or.us/wildlife/sagegrouse/docs/20110422_GRSG_April_Final%2052511.pdf

In Oregon, the quality of the sagebrush cover is below the 70/30 objective when considering the presence of invasive plant species in the understory vegetation. The Vegetation Dynamics Development Tool (VDDT) captures acres of sagebrush over story with an invasive plant species understory using Integrated Landscape Assessment Project (ILAP) data. Where invasive plant species understory occurs in the first or second stages, the vegetation cover is not

considered quality sagebrush due to the functionality of the sagebrush and the likelihood of conversion during the next wildfire.

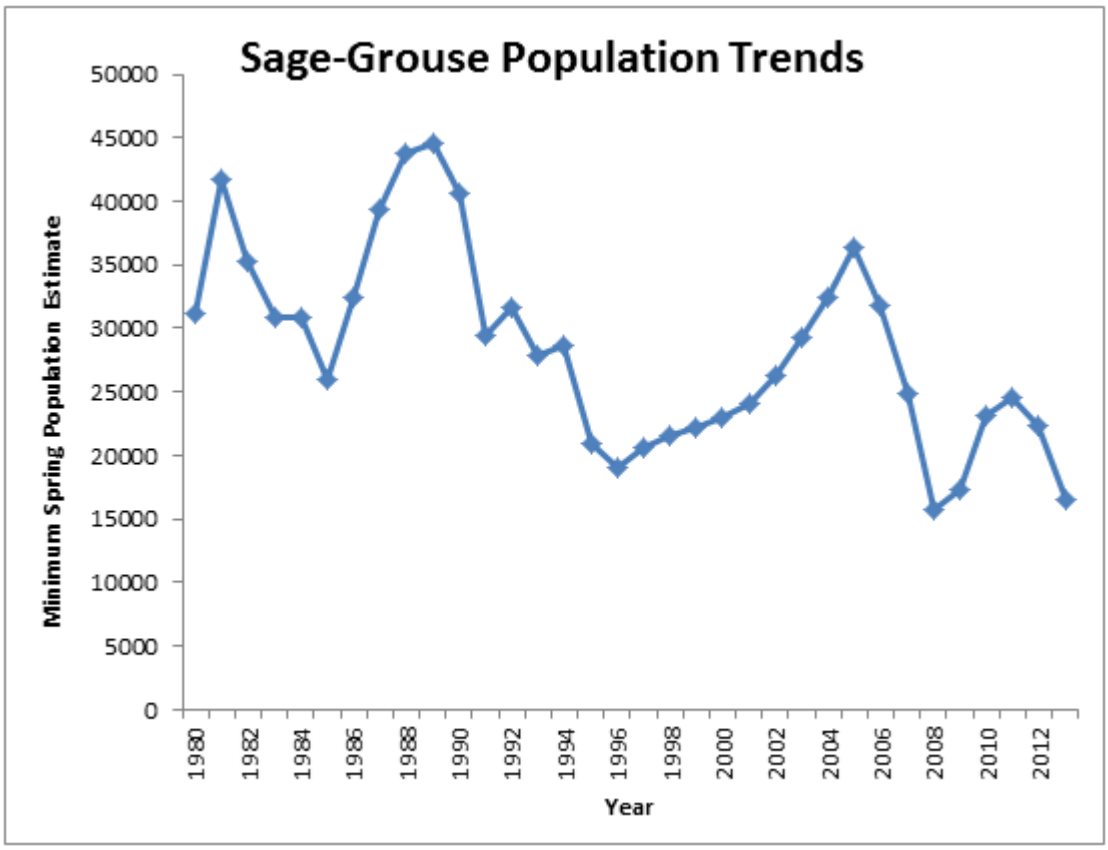
The Great Basin vegetation dynamics modeling effort was used to determine general habitat trends considering a variety of primary habitat influences (e.g., wildfire, risk of overgrazing, insects and disease, conifer encroachment, vegetation treatments). Based on these inputs and the natural rates sagebrush systems transition between stable conditions, modeling was conducted to quantify the direction and magnitude of non-geospatial acreage trends in relation to sagebrush conditions most likely to provide GRSG habitat. It is important to note that the modeling effort did not include changes in habitat conditions associated with permitted activities, which are considered discrete disturbances analyzed in the infrastructure development (ROWs and roads), travel management, and energy/mineral development sections.

3.2.2 Trends

Greater Sage-Grouse

Within the extant range of GRSG in Oregon, spring population indices have demonstrated an overall decline since the 1940s (Hagen 2005). GRSG populations declined at an overall rate of 3.50 percent per year from 1965 to 2003 (Connelly et al. 2004). However, statewide spring trends over the past 30 years (1980 to 2010) were relatively stable with population increases in most areas from the mid-1990s through 2006 (Hagen 2011) (**Figure 3-3**, Sage-grouse population trends, 1980-2012, Oregon). Based on the best available information, there was a minimum (conservative) spring population estimate of 24,000 (range 21,064 to 27,115) GRSG in Oregon in Spring 2010 (Hagen 2011). The minimum estimated spring population size, based on lek data summarized over a 10-year period (2003-2013), suggest population sizes have fluctuated markedly over this time period. However, annual rates of change in lek attendance data obtained from trend leks, (i.e., breeding sites that have been counted consistently over a number of years and are considered a sub-sample of all leks in a region) indicate a recent decline in sage-grouse numbers. Compared to 2012, male lek attendance in 2013 was down approximately 24 percent across the region. In 2012, GRSG experienced below average production, likely resulting in decreased lek attendance rates. The number of chicks per hen was 0.8 in 2012 and is below the 20-year average of 1.5. Additionally, the percent chicks in the 2012 harvest were 29 percent representing the second lowest report on record since 1992. Consequently, GRSG population size was expected to decrease in Oregon in 2013. In addition, several large wildfires burned through GRSG habitats in the summer of 2012, and significant GRSG habitat losses were sustained in Oregon, which may have contributed to population declines. The full effects of these large-scale wildfires remain unknown at this time.

Figure 3-3 Sage-grouse population trends, 1980-2012, Oregon



Source: ODFW 2013

The ODFW population objective is to "manage greater sage-grouse statewide to maintain or enhance their abundance and distribution at the 2003 spring breeding population level, approximately 30,000 birds over the next 50 years" (Hagen 2011). Currently, GRSG numbers in Oregon are below this benchmark but have not reached levels that are outside the range of natural variation (the 10-year average is 24,516 ± 5,097 GRSG, and the range is 15,803 to 36,405; Hagen 2011). Because of natural fluctuations in populations, the ODFW anticipates the population will drop below the 2003 benchmark, possibly by as much as 50 percent during some years. In Oregon, GRSG habitat (defined as any vegetation type that includes sagebrush) declined from approximately 17.8 million acres prior to EuroAmerican contact to 14 million acres today, a 21 percent decline. Most of this loss occurred in the north-central region of the potential historic range (Hagen 2011). The Central Oregon population, which inhabits the Prineville District, is estimated to have only 53 percent of historic sagebrush habitat, having lost more historic habitat than any other BLM district in Oregon. A large proportion was lost to agriculture. In the Burns District, sagebrush habitat has decreased by 8.8 percent much of which was conversion of private land to agriculture. Conversion of sagebrush habitat to agriculture reached a threshold in the mid-1950s and has remained relatively unchanged

since. However, the number of irrigated acres has increased slightly in some areas since the 1950s.

Compared with other portions of GRSG range in the western US, Oregon has large expanses of contiguous habitat with minimal threats of fossil fuel exploration or development. In the Oregon portion of the Western Great Basin population area, encompassing nearly all of the Lakeview District and large portions of the Burns and Vale Districts, over 80 percent of the historic GRSG habitat remains intact, and most of the habitat is in public ownership, this area alone supported over 10,000 birds in 2010 (USFWS 2013a). Despite the continued existence of large occupied areas, GRSG populations occupying small, disjunct areas at the edge of the current range are at risk of extirpation (Schroeder et al. 1999; Schroeder et al. 2004; Wisdom et al. 2011). Several areas within the planning area remain contiguous only because of small and tenuous corridors (Hagen 2011). GRSG have disappeared from certain peripheral habitats in the planning area within the past 40 years.

Prior to 2012, there had been a total decrease of nearly 3 percent in sagebrush due primarily to wildfire. From 1980 to 2003, over 600,000 acres of sagebrush were affected by wildfire. Wildfires have burned approximately 295,000 acres of high priority GRSG habitat in Oregon from 2004 to 2009 (Hagen 2011). Acres of sage-grouse habitat burned in 2012 surpassed all historic records for eastern Oregon. More sagebrush habitat was burned in 2012 than in the previous 23 years. Approximately 312,321 acres of PGH and 632,842 acres of PPH burned. Thus, approximately 6.4 percent of GRSG habitat in Oregon burned in Oregon in 2012. Most of this was in prime GRSG habitat (e.g., Trout Creek Mountains), representing nearly 10 percent of the available PPH in the state.

Juniper encroachment in GRSG habitat has impacted an additional 2.8 million acres. Juniper expansion has doubled in GRSG range (from 1.6 to 3.3 million acres) since European settlement, much of which has occurred in the Prineville District. Tree removal is widely assumed to benefit GRSG populations, although studies have yet to document a relationship between juniper removal and increased GRSG productivity. In Oregon, the BLM and Natural Resources Conservation Service (NRCS) through its Sage-Grouse Initiative are reducing the fragmentation threat of juniper encroachment in high priority sage-grouse habitats. Habitats with over 10 percent conifer canopy cover (i.e., Phase I and II encroachment) are targeted for conifer removal.

Currently, wildfire, invasive plant species, and juniper encroachment, are the three most significant factors causing habitat loss in Oregon (Hagen 2011). Net loss of sagebrush habitat has only slightly been offset by the acres of juniper removal.

3.3 VEGETATION

Vegetation serves multiple purposes on the landscape and provides many ecosystem services, including stabilizing soils, preventing erosion, using carbon

dioxide, releasing oxygen, increasing species diversity, and providing habitat and food for animals and products for human use. Many of the BLM's land management policies are directed toward maintenance of healthy vegetation communities. Vegetation can be characterized generally by ecological provinces and more specifically by plant communities. The ecological provinces and plant communities discussed below are those that provide the most important land cover across the planning area.

USFWS identified invasive plants and conifer encroachment as vegetation issues of concern in GRSG habitat (USFWS 2010a). Of all the invasive plant species, annual grasses in particular were identified as especially problematic (see Noxious Weeds and Invasive Species, below, section for more detail). Western juniper (*Juniperus occidentalis* var. *occidentalis*) is the encroaching conifer of concern in Oregon. Both invasive plants and juniper can reduce or eliminate GRSG food and cover, and alter disturbance regimes in a manner detrimental to GRSG habitat quality and quantity. Juniper also provides perch sites for avian predators.

Although not specifically addressed in the 2010 listing decision, the use of non-native grasses, especially crested wheatgrass (*Agropyron cristata* and *A. desertorum*), in post-fire restoration efforts and in past range improvement projects is not preferred when native grass species provide a viable alternative, and its use under these circumstances is of concern to both USFWS and ODFW.

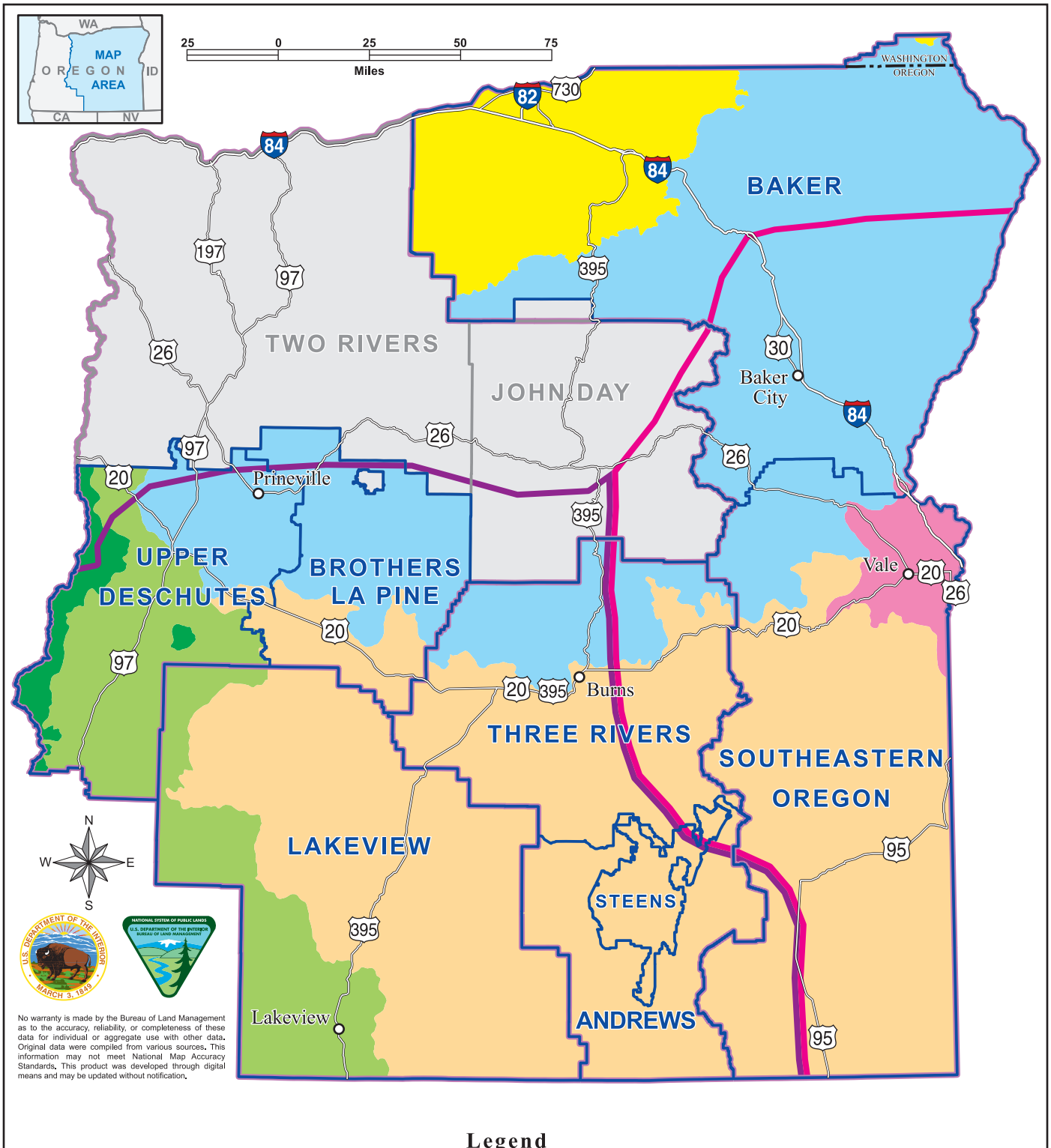
Public lands are undergoing complex environmental challenges that go beyond traditional management boundaries. In response, the BLM is instituting a landscape-scale management approach which evaluates large areas to better understand the ecological values, human influences, and opportunities for resource conservation. The BLM's landscape approach includes REAs which provide a framework for integrating science and management. REAs evaluate landscape scale ecoregions, which are large areas with similar environmental characteristics. In the Oregon Sub-region, the Northern Great Basin ecoregion REA is underway. Additional information is provided on the BLM Northern Great Basin REA website at http://www.blm.gov/wo/st/en/prog/more/Landscape_Approach/reas/nbasinrange.html.

3.3.1 Existing Conditions

Conditions of the Planning Area

General Vegetation

Southeast Oregon falls within multiple ecoregions (Wiken et al. 2011) (**Figure 3-4**, Ecoregions in the Planning Area). Of these ecoregions, most of the GRSG habitat falls within the Northern Basin and Range Ecoregion. The topography



Legend

- BLM Office
- Greater Sage-Grouse RMP Boundary
- Non-GRSG RMP Area

WAFWA Management Zones

- Zone IV- Snake River Plain
- Zone V- Northern Great Basin

Level 3 Ecoregions

- Blue Mountains
- Cascades
- Columbia Plateau
- Eastern Cascades Slopes and Foothills
- Northern Basin and Range
- Snake River Plain

Figure 3-4: Ecoregions in the Planning Area

M11-11-04

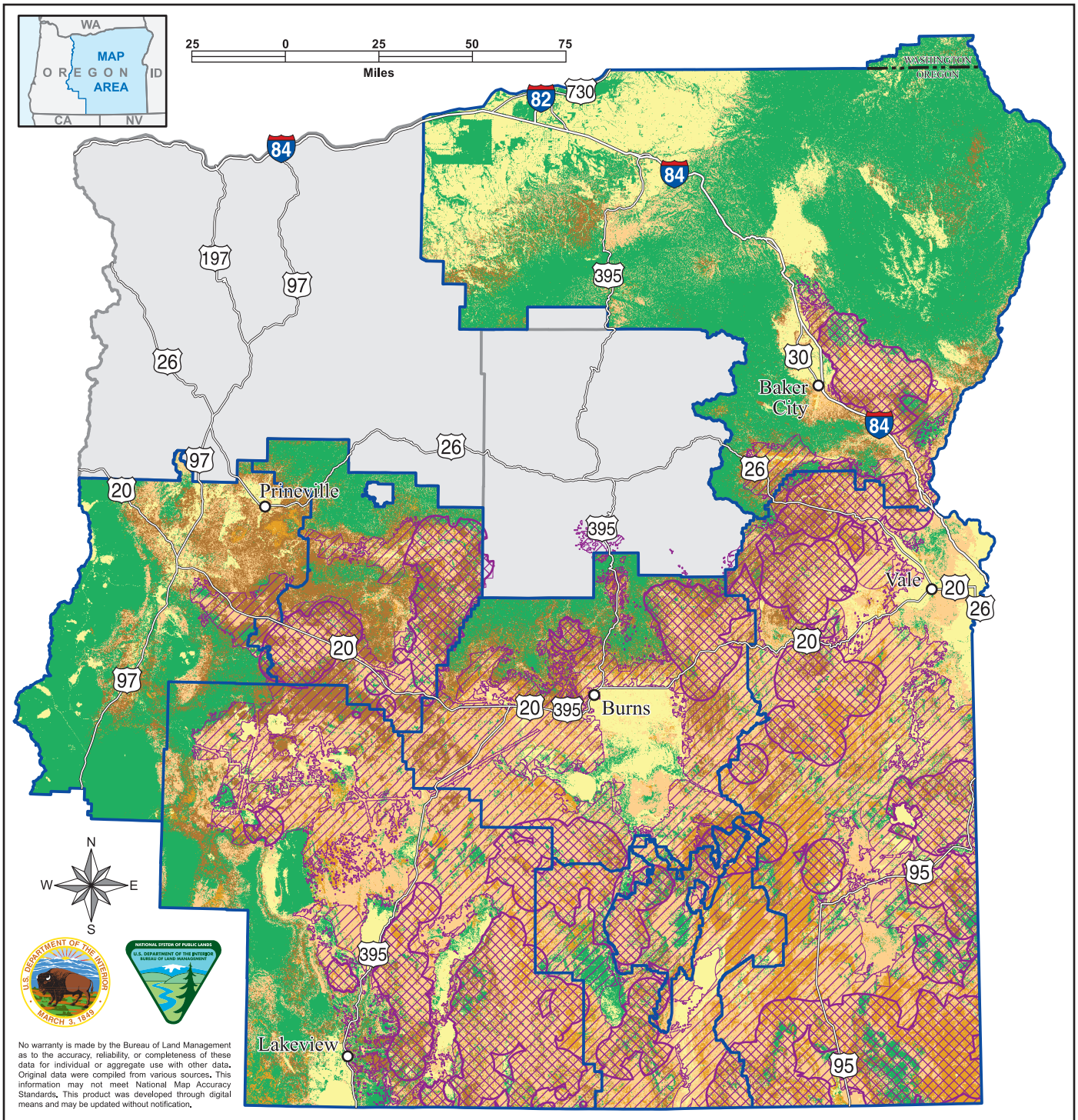
within these ecoregions is quite diverse, consisting of dissected lava plains, rolling hills, alluvial fans, valleys and scattered long linear north-south trending mountain ranges. There are innumerable large and small closed basins surrounded by extensive terraces formed in ancient lakes.

Vegetation conditions within the planning area generally, and on BLM-administered lands specifically, are relatively similar. One key difference is that privately owned lands have fewer restrictions on vegetation management activities, so landowners can \have more restoration options available and can treat more acres if adequate resources are available. For example, until October 2010, herbicide use on BLM-administered lands was severely restricted such that herbicides were rarely used as part of invasive plant or juniper management. On privately owned lands, these restrictions were not present. In many cases, the current extent of different types of vegetation or its condition is not known on lands other than BLM-administered lands. What information does exist on private, state, and other federal lands is generally incomplete.

Although this section includes estimates of the number of acres in each vegetation type analyzed, confidence in the accuracy of these estimates is low to moderate. Planning area-wide vegetation mapping has occurred as part of several different projects, such as SageMap, ReGAP, LANDFIRE and the Integrated Landscape Assessment Project. However, each effort used different imagery or the same imagery processed in different ways such that agreement between maps is relatively low. Accuracy of vegetation data based on remote sensing models is good at the regional or WAFWA management zone scale; however, data accuracy decreases with scale. When using remotely sensed data at finer scales, site-specific data are important to supplement the model. In addition, certain vegetation types are very difficult to map in semi-arid environments due to limited extent (riparian), high interannual variability (annual grassland, sagebrush-steppe), difficulty in distinguishing key species (crested wheatgrass seedings, sagebrush-steppe), and the inability to detect the early stages of juniper encroachment (juniper woodland), especially with data at coarse scales, such as in LANDSAT imagery (**Figure 3-5**, Vegetation in the Planning Area).

Noxious Weeds and Invasive Species

Noxious weeds and exotic invasive plant species compete with native vegetation for water, space, and nutrients. Invasive plants, defined in BLM Departmental Manual 9015 as "a species that is non-native to the ecosystem under consideration and whose introduction does or is likely to cause economic or environmental harm or harm to human health." The BLM considers plants invasive if they have been introduced into an environment where they did not evolve. As a result, they usually have no natural enemies to limit their reproduction and spread (Westbrooks 1998). Invasive plants can produce significant changes to vegetation, composition, structure, or ecosystem function



Legend

- BLM Office
- GRSG RMP Boundary
- Non-GRSG RMP Area

Greater Sage-Grouse Habitat

- Preliminary Priority Habitat
- Preliminary General Habitat

Vegetation

- Tall Sagebrush Shrubland and Steppe
- Dwarf Sage Shrubland and Steppe
- Dry Shrubland and Grassland
- Trees, Wetlands, Not Sagebrush
- Not Vegetation

Figure 3-5: Vegetation in the Planning Area

M11-11-04

(Cronk and Fuller 1995). Invasive plant species tend to displace native species used by GRSG for food and cover (Miller et al. 2011).

Noxious weeds are a subset of invasive plants that are state or federally listed as harmful to public health, agriculture, recreation, wildlife and any private or public property. These weeds are regulated by the Federal Noxious Weed Act of 1974 and the Oregon noxious weed policy (Oregon Department of Agriculture 2013).

Riparian and Wetland

Riparian areas include both lotic (running water) and lentic (standing water) systems. Many riparian areas are associated with wetlands, which occur wherever the water table is usually at or near the surface or where the land is at least seasonally covered by shallow water. In the planning area, wetlands include marshes, shallow swamps, lake shores, sloughs, bogs, and wet meadows.

Wetlands and riparian systems typically provide wildlife with green forage, insects, and drinking water. Green forage is especially important for many wildlife species during the summer and fall when upland vegetation dries out. Although riparian areas and wetlands cover less than 1 percent of the planning area, their ecological significance far exceeds their limited physical area. Riparian and wetland areas are major contributors to ecosystem productivity and structural and biological diversity, particularly in drier climates (Elmore and Beschta 1987).

Treeless riparian areas and the edges of wetlands can be important late brood-rearing areas for GRSG as the longer presence of water maintains forb succulence later into the summer (Hagen 2011). Since riparian areas are typically very narrow, they generally are not mapped directly but are assumed to be present along perennial streams. Wetlands may consist of ephemerally wet areas, such as old lakebeds and playas or more permanent wet areas, and can be mapped. Probably the most significant and valuable riparian areas and wetlands for GRSG are those associated with isolated springs and streams scattered over the arid landscape. The variety of shrubs, grasses, and forbs present depends on the degree and duration of wetness and shade at each location (Gregory et al. 1991).

Prior to the 1970s, many riparian/wetland areas were degraded by uncontrolled uses. Any management activity that disturbs water, soil, or vegetation can potentially degrade riparian areas. Such activities include livestock grazing, road construction, timber harvest, mining, irrigation, and recreation. In addition, off-site activities can affect riparian areas by influencing the timing and amount of overland and subsurface flow of water and movement of soils. Some past land use practices have resulted in riparian areas that have inadequate vegetation to protect streambanks from erosion; lack appropriate diverse vegetation that provides habitat for riparian-dependent wildlife species; contain incised channels

that do not allow streams to dissipate flood energy and provide water storage; and provide inadequate pools and shade for aquatic species.

Conditions on BLM-Administered Lands

Acres of vegetation communities within PPH and PGH on BLM-administered lands within the planning area are presented in **Table 3-4**, Acres of Vegetation Communities within PPH and PGH on BLM-Administered Lands within the Planning Area.

Table 3-4
Acres of Vegetation Communities within PPH and PGH on BLM-Administered Lands within the Planning Area

Vegetation Community	Designated PGH (acres)	Designated PPH (acres)	Non-Designated (acres)	Total (acres)
Cool-Moist Sagebrush Steppe	181,719	324,338	71,633	**577,690**
Warm-Dry Sagebrush Steppe	3,195,814	2,218,285	654,696	**6,068,795**
Shallow-Dry Sagebrush Steppe	662,138	1,306,521	43,568	**2,012,227**
Other Sagebrush-Steppe	180,366	73,731	67,675	**321,772**
Dominated by Invasive Plant Species	538,920	284,658	168,606	**992,184**
Federally listed and State-listed Noxious Weeds	31,572	19,026	34,023	**84,621**
Other non-listed weeds	4	15	128	**147**
Juniper Woodland	488,591	204,785	519,140	**1,212,516**
Crested Wheatgrass Seedings	67,558	25,518	95,947	**189,023**
Wetlands	14,608	27,900	34,442	**76,950**
Perennial Streams	327 miles	160 miles	527 miles	**1,014 miles**
Non-habitat	886,701	394,805	1,721,893	**3,003,399**

Sources: SageMap, data downloaded 18 May 2012, Integrated Landscape Assessment Project, BLM Corporate Weeds Database and Noxious Invasive Species Information Management System (NISIMS), 2013.

Sagebrush-Steppe

Sagebrush-steppe is the primary habitat for GRSG. In Oregon, sagebrush-steppe is divided into three main types based on site productivity as identified in ecological site descriptions. Most of the planning area is dominated by sagebrush, despite the widespread prevalence of invasive plants, juniper encroachment, and crested wheatgrass seedings (**Table 3-4**). There is some degree of overlap between the acres identified as sagebrush steppe, dominated by invasive plant species, juniper woodland, and crested wheatgrass seedings due to the difficulty in clearly separating these types. For example, an area may

be mapped as sagebrush steppe in one mapping effort but identified as having a high component of invasive plant species in another. The degree of overlap is not known.

Cool-Moist Sagebrush Steppe (M169 Intermountain and Great Basin Tall Sagebrush Shrubland and Steppe)

The Cool-Moist Sagebrush Steppe is typically found in moderately deep to deep soils with a frigid temperature regime and xeric moisture regime (Anderson 1998; Kagan and Caicco 1996). As such, it is typically found at the higher elevations where the average annual precipitation exceeds 12 inches annually, and on cooler, moister aspects at mid-elevations. Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) is the most common big sagebrush subspecies present, often with antelope bitterbrush (*Purshia tridentata*) as a co-dominant. Wyoming big sagebrush (*A. t.* ssp. *wyomingensis*) and basin big sagebrush (*A. t.* ssp. *tridentata*) can also be present, primarily in the ecotone between the Cool-Moist and Warm-Dry Sagebrush Steppe. Low sagebrush (*A. arbuscula*) is dominant where soils are shallower and saturate at least once every 10 years, precluding big sagebrush.

Idaho fescue (*Festuca idahoensis*) is one of the more common native grasses in the Cool-Moist Sagebrush Steppe with bluebunch wheatgrass (*Pseudoroegneria spicata*) a common co-dominant. These sites are also forb-rich, particularly when sagebrush cover is relatively low. Because grasses and forbs cure later in the summer, the Cool-Moist Sagebrush Steppe provides important late brood-rearing habitat and can provide nesting and wintering habitat at the ecotone and in winters with less snow.

Warm-Dry Sagebrush Steppe (M171 Intermountain and Great Basin Dry Shrubland and Steppe)

The Warm-Dry Sagebrush Steppe is typically found in shallow to moderately deep soils with a mesic soil temperature regime and aridic moisture regime (Anderson 1998; Kagan and Caicco 1996). This sagebrush type is typically located in the low elevations where the average annual precipitation is less than 12 inches annually and on warmer, drier aspects at mid-elevations. Wyoming big sagebrush is the most common big sagebrush subspecies with low sagebrush dominant on shallower soils that saturate at least once every 10 years, and mountain big sagebrush present at the ecotone with the Cool-Moist Sagebrush Steppe. Deeper soils may support basin big sagebrush. Soils with a higher salt content typically include spiny hopsage (*Grayia spinosa*), black greasewood (*Sarcobatus vermiculatus*), or shadscale (*Atriplex confertifolia*). The Warm-Dry Sagebrush Steppe is often intermingled with the Shallow-Dry Sagebrush Steppe.

Bluebunch wheatgrass and Thurber's needlegrass (*Achnatherum thurberianum*) are the most common native grasses. The Warm-Dry Sagebrush Steppe supports the greatest number of invasive plant species, including the exotic annual grasses, and the highest proportion of crested wheatgrass seedings. Most

of the area impacted within this type is associated with the increased frequency of wild fire and slow recovery time following wild fire. However, this sagebrush type also provides the most wintering, nesting, and early brood-rearing habitat for GRSG.

Shallow-Dry Sagebrush Steppe (M170 Intermountain and Great Basin Dwarf Sagebrush Shrubland and Steppe)

The Shallow-Dry Sagebrush Steppe is found on shallow to very shallow soils with an frigid soil temperature regime and a aridic to mesic moisture regime (Anderson 1998; Kagan and Caicco 1996). The Shallow-Dry Sagebrush Steppe can occur at any elevation, but is most common at lower elevations intermingled with the Warm-Dry Sagebrush Steppe. Low sagebrush is the most common sagebrush species, but black sagebrush (*Artemisia nova*) or stiff sagebrush (*A. rigida*) communities are also included. This type includes some very unproductive big sagebrush communities such as basin big sagebrush communities in lava fields and on deep pumice, Wyoming big sagebrush communities on slightly deeper soils and mountain big sagebrush communities on slightly deeper and cold soils. Saltier soils may include spiny hopsage, black greasewood, shadscale and winterfat (*Krascheninnikovia lanata*).

The Shallow-Dry Sagebrush Steppe is grass-poor but forb-rich. Sandberg's bluegrass is the most common native grass species and bare ground can be extensive. Invasive plant species may also be present and can become dominant following fire. The Shallow-Dry Sagebrush Steppe provides important habitat for pre-laying hens and for brood-rearing, particularly near the edges adjacent to the Warm-Dry or Cool-Moist Sagebrush Steppe. It provides some wintering habitat in years with less snow and where the sagebrush are a bit taller. GRSG leks may also be located in this type.

Other Sagebrush Steppe

Two other types of sagebrush steppe occur within the planning area, but are limited in size and widely scattered. Remnants of what would have been Warm-Moist Sagebrush Steppe may still be found in lower elevations as small patches along streams and road edges in deep to very deep soils that are subirrigated. Much of this type was converted to agriculture during the Euro-American settlement period and now supports irrigated hay, grain, and vegetable crops. Basin big sagebrush and basin wildrye are the two species most commonly associated with this type. The silver sagebrush steppe is another minor type usually found in semi-wet meadows, flood plains of rivers, moist semi-alkaline flats, and playas. Silver sage is the dominant and characteristic shrub of this community. It grows in areas that have been deflated (eroded by wind) and subsequently partially filled with ingrained sediments. Although species such as creeping wildrye occasionally occur, the understory can be dominated by widely spaced, often robust bunchgrasses such as Nevada bluegrass. GRSG use of these two minor sagebrush steppe types in southeastern Oregon is not well known, but some nesting may occur.

Invasive Plants

The invasive plant species of concern for GRSG are well adapted to the semi-arid environments of eastern Oregon. Available data show there are 69 invasive weed species occurring in the planning area on BLM-administered lands, with 52 that are federally listed (USDA 2010) or state-listed (Oregon Department of Agriculture 2013) noxious weed species. There are 35 noxious weed species occurring within PGH or PPH (**Table 3-5**, Greater Sage-Grouse Habitat Acres of Occurrences for Federally Listed and State-Listed Noxious Weeds (sorted by PGH/PPH acres)), and **Table 3-6**, Greater Sage-Grouse Habitat Acres of Occurrences for Other Invasive Plant Species). Many of these species occur within sagebrush communities utilized by GRSG, including active and unoccupied leks (BLM 2013b). Analysis of invasive weeds found 34 species occurring on 37,212 acres within 3 miles of active and inactive leks (**Table 3-7**, Acres of Occurrences of Invasive Plant Species within 3 Miles of Occupied and Unoccupied Leks by BLM District). Some of the acres of weed species documented are quite small, and many occur on less than one hundredth of an acre, but the total occupied acres of other groups is quite large, with the thistles occupying tens of thousands of acres.

Table 3-5
Greater Sage-Grouse Habitat Acres of Occurrences for Federally Listed and State-Listed Noxious Weeds (sorted by PGH/PPH acres)

Scientific Name	Common Name	Non-Habitat	PGH	PPH
Taeniatherum caput-medusae	Medusahead rye	10,151	10,539	12561
Cirsium arvense	Canada Thistle	2,030	7,478	620
Cirsium vulgare	Bull Thistle	2,653	7,133	795
Onopordum acanthium	Scotch Thistle	2,604	1,386	1993
Cardaria draba	Whitetop (hoary cress)	2,243	1,316	1408
Lepidium latifolium	Perennial pepperweed	1,285	1,546	263
Acroptilon repens	Russian Knapweed,	1,571	356	380
Salvia aethiopis	Mediterranean sage	502	375	249
Linaria dalmatica	Dalmation Toadflax	2,136	572	21
Halogeton glomeratus	Halogeton	56	82	459
Centaurea stoebe	Knapweed, Spotted	1,691	302	35
Centaurea diffusa	Knapweed, Diffuse	2,455	258	48
Centaurea solstitialis	Starthistle, Yellow	675	46	90
Euphorbia esula	Spurge, Leafy	200	51	35
Chondrilla juncea	Rush skeletonweed	1,666	47	8
Tamarix ramosissima	Saltcedar	12	36	0.3
Cynoglossum officinale	Houndstongue	858	11	17
Xanthium spinosum	Spiny cocklebur	4	2	24
Tribulus terrestris	Punctureving	149	24	0.9
Salsola tragus	Russian thistle	64	2	12

Table 3-5
Greater Sage-Grouse Habitat Acres of Occurrences for Federally Listed and State-Listed Noxious Weeds (sorted by PGH/PPH acres)

Scientific Name	Common Name	Non-Habitat	PGH	PPH
Carduus nutans	Thistle, Musk	10	7	0.0007
Convolvulus arvensis	Field bindweed	9	2	2
Hypericum perforatum	St. Johnswort	12	0.02	2
Aegilops cylindrical	Jointed Goatgrass	6	1	0.7
Orobanche minor	Small broomrape	0	0	1
Potentilla recta	Sulfur cinquefoil	18	0.2	0.05
Lythrum salicaria	Purple loosestrife	0.5	0	0.2
Centaurea virgata	Knapweed, Squarrose	35	0.1	0.006
Isatis tinctoria	Dyers woad	0	0.1	0.002
Polygonum cuspidatum	Japanese Knotweed (fleece flower)	2	0	0.1
Linaria vulgaris	Yellow Toadflax	32	0.1	0
Senecio jacobaea	Tansy ragwort	0	0.01	0.006
Conium maculatum	Poison hemlock	22	0	0.003
Cytisus scoparius	Scotch broom	0.4	0	0.002
Solanum elaeagnifolium	Silverleaf nightshade	0	0	0.0003
Anchusa officinalis	Common bugloss	14	0	0
Cardaria pubescens	Whitetop, Hairy	3	0	0
Carduus acanthoides	Thistle, Plumeless	26	0	0
Centaurea calcitrapa	Purple Starthistle	0.0006	0	0
Centaurea iberica	Iberian Starthistle	13	0	0
Clematis vitalba	Old man's beard	14	0	0
Dipsacus laciniatus	Cutleaf teasel	576	0	0
Euphorbia myrsinites	Myrtle Spurge	1	0	0
Hemizonia pungens	Spikeweed	21	0	0
Hieracium aurantiacum	Orange hawkweed	2	0	0
Hieracium pratense	Hawkweed, Meadow	32	0	0
Iris pseudacorus	Yellow flag iris	10	0	0
Kochia scoparia	Kochia	155	0	0
Opuntia aurantiaca	Jointed Prickly Pear	0.01	0	0
Peganum harmala	African rue	0.4	0	0
Rubus aremeniacus	Himalayan Blackberry	1	0	0
Solanum rostratum	Buffalobur	0.2	0	0
Total Noxious Weed Acres		**34,023**	**31,572**	**19,027**

Source: Oregon/Washington BLM 2013

Table 3-6
Greater Sage-Grouse Habitat Acres of Occurrences for Other Invasive Plant Species[1]

Scientific Name	Common Name	Non-Habitat	PGH	PPH
Centaurea melitensis	Maltese Starthistle	0	0	0.0008
Cichorium intybus	Chicory	0	0	1
Cirsium undulatum	Wavyleaf Thistle	0.1	0	0
Digitalis purpurea	Purple Foxglove	10	0	0
Dipsacus fullonum	Fullers' Teasel	26	0.0007	0.5
Elaeagnus angustifolia	Russian Olive	11	1	0.0003
Hyoscyamus niger	Black henbane	0	1	1
Leucanthemum vulgare	Oxeye Daisy	0.1	0	0.3
Melilotus officinalis	Yellow Sweet Clover	0	2	12
Phalaris arundinacea	Reed Canarygrass	0.03	0	0
Sisymbrium altissimum	Tumble Mustard	0.003	0	0
Solanum dulcamara	Bitter/climbing nighshade	0	0	0.0002
Verbascum thapsus	Common mullein	79	0	0
Vinca major	Bigleaf periwinkle	2	0	0
Xanthium strumarium	Rough Cocklebur	0	0	0.05
Total Acres		**129**	**4**	**15**

Source: Oregon/Washington BLM 2013
[1]Does not include annual grasses, which as estimated to occur on approximately 1 million acres

Table 3-7
Acres of Occurrences of Invasive Plant Species within 3 Miles of Occupied and Unoccupied Leks by BLM District

Scientific Name	Common Name	Burns District	Lakeview District	Prineville District	Vale District
Acroptilon repens	Russian Knapweed	16	34	264	18
Aegilops cylindrical	Jointed Goatgrass				1
Cardaria draba	Whitetop (hoary cress)	2,407	73	360	1,224
Carduus nutans	Musk Thistle	0.02	0.09		
Centaurea diffusa	Diffuse Knapweed	118	0.001	7	60
Centaurea iberica	Starthistle, Iberian				0.007
Centaurea solstitialis	Starthistle, Yellow	7	0.001		79
Centaurea stoebe	Knapweed, Spotted	171	0.003	3	29
Chondrilla juncea	Rush skeletonweed				12
Cirsium arvense	Canada Thistle	5,633	145	218	10
Cirsium vulgare	Bull Thistle	5,542	56	114	0.8
Conium maculatum	Poison hemlock	0.003	0.0007		
Convolvulus arvensis	Field bindweed	9	0.0007		0.0002
Cynoglossum officinale	Houndstongue				22
Dipsacus fullonum	Fullers' Teasel		1		0.1
Elaeagnus angustifolia	Russian olive	0.007			0.0003

Table 3-7
Acres of Occurrences of Invasive Plant Species within 3 Miles of Occupied and Unoccupied Leks by BLM District

Scientific Name	Common Name	Burns District	Lakeview District	Prineville District	Vale District
Euphorbia esula	Spurge, Leafy				40
Hyoscyamus niger	Black henbane	1			0.4
Hypericum perforatum	St. Johnswort	2	0.2		
Isatis tinctoria	Dyers woad	0.1			
Lepidium latifolium	Perennial pepperweed	1,126	702	9	152
Leucanthemum vulgare	Oxeye Daisy				0.3
Linaria dalmatica	Dalmation Toadflax	342	0.0007		0.1
Lythrum salicaria	Purple loosestrife	0.1			0.2
Onopordum acanthium	Scotch Thistle	1,190	5	0.1	339.
Polygonum cuspidatum	Knotweed, Japanese (fleece flower)				0.1
Potentilla recta	Sulfur cinquefoil				0.05
Salvia aethiopis	Mediterranean sage	201	530		5
Senecio jacobaea	Tansy ragwort	0.008			
Solanum elaeagnifolium	Silverleaf nightshade				0.0003
*Taeniatherum caput-medusae**	Medusahead rye	11,730	3,033	4	1,158
Tamarix ramosissima	Saltcedar				2
Tribulus terrestris	Puncturevine	0.02			1
Xanthium spinosum	Spiny cocklebur				0.1
Total invasive plant Lek acres		**28,495**	**4,582**	**980**	**3,155**

Source: Oregon/Washington BLM 2013
*Acres for medusahead rye is likely incomplete and an under-estimation

As shown in **Table 3-4**, nearly 285,000 acres of PPH are dominated by invasive plant species, but only 19,000 of these acres are dominated by listed noxious weeds. There are 17 invasive plants of concern that are not officially on the federal or Oregon Department of Agriculture noxious weed lists. These invasive plant species are not tracked as official noxious weeds, even though a few of them are having a tremendous effect on the ecosystem. Most notable is an annual grass complex made up of the state-listed noxious weed medusahead (*Taeniatherum caput-medusae*), the invasive species of concern cheatgrass (*Bromus tectorum*), and North Africa grass (*Ventenata dubia*), which are estimated to occur on a million acres of BLM-administered lands in eastern Oregon (BLM 2010a). BLM data on cheatgrass are incomplete and the species is widely underreported in the noxious weed databases. Disturbances such as wildfire can promote the large-scale conversion of native vegetation to cheatgrass, medusahead, and *Ventenata*. Once converted to invasive plant species, restoration of native vegetation is extremely time-consuming and resource-

intensive. The best option for control of weed spread is prevention of wildfire and weed control efforts to prevent spread in the first place.

The other major groups of noxious weeds in PPH and in close proximity to leks in the planning area are a number of thistles; Canada thistle (*Cirsium arvense*), bull thistle (*C. vulgaris*), Scotch thistle (*Onopordum acanthium*), Russian thistle (*Salsola kali*), and musk thistle (*Carduus nutans*), a number of weedy mustards; white top (*Cardaria draba*), perennial pepperweed (*Lepidium latifolium*), and dyers woad (*Isatis tinctoria*); and a number of knapweeds, Russian knapweed (*Acroptilon repens*), diffuse knapweed (*Centaurea diffusa*), yellow starthistle (*C. solstitialis*), spotted knapweed (*C. stoebe*), and squarrose knapweed (*C. virgata*). Other listed noxious weeds with substantial acreage within GRSG habitat include: Dalmatian toadflax (*Linaria dalmatica*), leafy spurge (*Euphorbia esula*), Mediterranean sage (*Salvia aethiopis*), saltlover (*Halogeton glomeratus*) puncturevine (*Tribulus terrestris*), rush skeletonweed (*Chondrilla juncea*), houndstongue (*Cynoglossum officinale*), common St. Johnswort (*Hypericum perforatum*), spiny cocklebur (*Xanthium spinosum*), tansy ragwort (*Senecio jacobaea*), and jointed goatgrass (*Aegilops cylindrica*).

In all, federal and state listed noxious weeds tracked by the BLM in the corporate databases occur on 84,623 acres within the planning area; there are 31,572 acres of noxious weeds in PGH, and another 19,026 acres within PPH. There are an additional 15 species in the database (not counting the invasive plant species) on 148 acres, of which only 19 acres are in PPH or PGH. This is likely an underestimate as non-federal or non-state listed weeds are often not well-documented.

Cheatgrass, medusahead, and other invasive annual grasses have widespread invasion potential (**Table 3-8**, Acres of Moderate to High Cheatgrass Potential within Greater Sage-Grouse Habitat in the Planning Area), and are considered most problematic due to the difficulties, expense, and low success rate in restoration; the lack of EPA-approved biological control agents or biopesticides; and the dramatic shortening of fire frequencies where invasive plant species dominate (Brooks et al. 2004; Sheley et al. 2011). Spatial data on the extent of the weedy annual grass complex (including medusahead, cheatgrass, and North African grass) are incomplete and estimated to be nearly (or likely over) a million acres within the planning area. Acres of moderate to high potential for cheatgrass occurrence are presented in **Table 3-8**.

All districts attempt to treat invasive plant infestations using a variety of methods under the umbrella of integrated pest management or ecologically-based invasive plant management, but emphasize prevention and early detection of new infestations. Specific prevention measures have been required during larger wildfires, but not for other land management activities, and are voluntary for recreation users. Treatment method categories include manual methods,

Table 3-8
Acres of Moderate to High Cheatgrass Potential within Greater Sage-Grouse Habitat in the Planning Area

Surface Management Agency	WAFWA Management Zone[1]	Total Acres[2]	Acres within PGH	Acres within PPH
BLM	IV	4,414,000	2,361,300	2,052,700
	V	5,412,200	3,663,900	1,748,300
Forest Service	IV	28,400	5,300	23,100
	V	137,600	101,200	36,400
Tribal and Other Federal	IV	75,100	49,500	25,600
	VI	237,900	66,500	171,400
Private	IV	1,679,700	798,900	880,800
	V	1,937,300	1,335,000	602,300
State	IV	331,000	244,800	86,200
	V	149,500	99,900	49,600
Other	IV	5,400	5,400	0
	V	0	0	0

Source: Manier et al. 2013
[2]Acreage comprised of areas with a moderate to high potential for cheatgrass occurrence

mechanical methods, biocontrol methods, prescribed fire, and herbicides. Until 2010, use of herbicides on BLM-administered lands was restricted through a court order. The result was that herbicides were used sparingly and with minimal effectiveness at the landscape scale. All four districts are preparing environmental assessments to expand the use of herbicides and other treatment methods to help control invasive plants. Those documents describe in more detail which herbicides are proposed for use, best management practices, and how herbicides will be incorporated into existing management programs. Use of pre-emergent herbicides targeted at the invasive plant species is increasing as part of post-fire rehabilitation efforts.

Observations and the scientific literature on cheatgrass indicate that, while it may be present on every acre, not every site is at equal risk of cheatgrass dominance. Cheatgrass is most likely to take site dominance where the soil moisture regime is xeric and the soil temperature regime is mesic, although its success at invasion where the soil moisture regime is aridic is increasing. However, even in that optimal soil temperature-moisture combination, cheatgrass can take site dominance following a stand-replacing disturbance such as fire only where native perennials have been depleted or killed by the disturbance (Miller et al. 2011b; Sheley et al. 2011). Thus, healthy rangelands can resist cheatgrass and potentially other invasive plant species (Sheley et al. 2011).

At present, treatment methods are most effective on small, isolated populations, or on newly established infestations (BLM 2010a; Sheley et al. 2011). Manual methods, such as hand pulling, are the least effective except for very few species

under limited conditions and rarely used. Mechanical methods, such as mowing, also are of limited effectiveness and tend to be restricted to road edges and rights-of-way (ROWs) on BLM-administered lands in an effort to contain invasive species (BLM 2010a). Bio-control releases for a few invasive forbs have occurred on or near BLM-administered lands, with some success. Prescribed grazing has occurred to a limited extent on Burns District although the success rate of this measure is not yet established. Prescribed burning for invasive species control can be very difficult to conduct successfully and may require burning at such frequencies that GRSG habitat also is adversely affected (Sheley et al. 2011), so this method is rarely, if ever, used on BLM-administered lands. Weed treatments are most effective when methods are combined under the integrated weed management approach, practiced in every BLM district.

All control methods usually require follow-up seeding or planting with non-invasive species that can compete with the invader (BLM 2010a; Sheley et al. 2011). Protocols and practices for post-treatment monitoring and adaptive management are covered in the Oregon Vegetation Treatment EIS (BLM 2010a). Seed zones for all of the native species intended for restoration have not been established; a seed zone is an area within which plant materials can be transferred with little risk of being poorly adapted to their new location. Using the EPA Level III eco-regions (Thorson et al. 2003) as seed transfer zones is a good surrogate when specific genetic or common garden studies are lacking, to ensure that material being used is adapted to the environment (Miller et al. 2011a; Johnson et al. 2010). Further refining seed zones within eco-regions by over-laying local climatic variables, such as maximum temperature, precipitation patterns, or elevation (e.g., less than or more than 4,500 feet), can also further refine adaption zones for plant transfer (Bower 2011; Vogel et al. 2005).

Juniper Encroachment

Western juniper is scattered throughout eastern Oregon, occurring in extensive stands and scattered patches and stringers. Western juniper is classified as M026 Intermountain Singleleaf Pinyon – Western Juniper Woodland. It has historically occupied the most xeric of the tree-dominated zones across eastern Oregon between 2,000 and 8,000 feet in elevation, primarily where average annual precipitation ranges from 10 to 15 inches (Gedney et al. 1999). Above 7,000 feet, extremes in temperatures and severe winter conditions limit juniper growth (Miller and Rose 1995). Most junipers grow on terraces, floodplains, grass-shrub uplands and plateaus-uplands. The distribution of juniper may also be affected by variables other than precipitation, elevation or soils. Because of the xeric environment where juniper grows, the species effectively out-competes other vegetation for available moisture which reduces understory vegetation, plant establishment and vigor (Jeppesen 1978).

The expansion of juniper woodlands over the last 120 years is well documented (**Table 3-9**, Acres of Sagebrush and Juniper Interface within Greater Sage-Grouse Habitat in the Planning Area; Eddleman 1986; Gedney et al. 1999; Miller et al. 2000). Miller and Tausch (2001) estimated the increase was ten-fold. Between 1936 and 1988, inventoried juniper woodlands and savannas across eastern Oregon increased by 433 percent, averaging 8.3 percent per year (Gedney et al. 1999). Between 1988 and 1999, inventoried juniper woodland and savanna increased by 50 percent, averaging 4.5 percent per year (Azuma et al. 2005). Historically, fire restricted western juniper to rockier areas that rarely burned (Miller et al. 2005). However, the highly intensive grazing from the late 1800s through mid-1900s is believed to have reduced fire frequency, allowing juniper to expand relatively rapidly into sagebrush steppe (Burkhart and Tisdale 1976; Miller and Rose 1995, Miller et al. 2005; Romme et al. 2009). The most wide-spread encroachment has been into the Cool-Moist Sagebrush Steppe with some encroachment into the Warm-Dry and Shallow-Dry Sagebrush Steppe. Eddleman (1987) reported that as much as 80 percent of juniper establishment occurs under the crown of sagebrush.

Table 3-9
Acres of Sagebrush and Juniper Interface within Greater Sage-Grouse Habitat in the Planning Area

Surface Management Agency	WAFWA Management Zone	Total Acres of Interface[1]	Acres within PGH	Acres within PPH
BLM	IV	201,800	78,400	123,400
	V	443,900	295,200	148,700
Forest Service	IV	7,800	2,400	5,400
	V	36,700	28,300	8,400
Tribal and Other Federal	IV	2,700	600	2,100
	V	14,600	4,000	10,600
Private	IV	101,400	45,500	55,900
	V	198,900	120,500	78,400
State	IV	29,300	25,200	4,100
	V	8,500	6,700	1,800
Other	IV	0	0	0
	V	0	0	0

Source: Manier et al. 2013
[1]Includes the number of acres where sagebrush land cover occurs within 120 meters of juniper land cover

Acres of interface between juniper and sagebrush ecosystems are shown in **Table 3-9**. Miller et al. (2005) categorized juniper encroachment into three phases. In Phase I, the shrub-steppe species still exert ecological dominance. Juniper is present primarily as seedlings and saplings with an occasional mature, seed-producing tree present. In Phase II, juniper has begun to exert ecological dominance as trees increase in size and density. Sagebrush begins to decrease and herbaceous vegetation begins to decline. Phase III represents a developed

juniper woodland, where trees dominate ecological processes and sagebrush is largely or completely gone from the site. As juniper saplings develop in Phase I, GRSG use declines rapidly due to increased tree height for perches improving predator habitat specifically avian predation.

Detecting Phase I juniper is very difficult using remote sensing methods and young juniper trees still within the crowns of sagebrush are easily missed during walk-through assessments and cursory surveys. Most vegetation treatments on BLM-administered lands target later Phase I through early Phase III juniper encroachment (see **Section 3.6**, Wildland Fire Management, for more details).

Crested Wheatgrass Seedings

In the 1960s and 1970s, extensive areas of degraded rangelands were treated to reduce sagebrush and then planted with crested wheatgrass (Heady 1988; Hagen 2011). Crested wheatgrass and other non-native grasses have also been widely used in post-fire restoration as these species often compete well with invasive plant species, unlike most native perennial grasses. Crested wheatgrass may be used as a fuelbreak between invasive plant species-dominated areas and relatively intact sagebrush-steppe. Crested wheatgrass remains the most prevalent and successful species in most seedings; sagebrush is present to some degree (Heady 1988; Karl and Sadowski 2005), but forbs and native perennial grasses are often uncommon to rare. The reasons for this are poorly understood and likely site-specific. In some locations, wind-derived soil crusts may limit the ability of other species to germinate or establish. In other locations, competition for water and nutrients by the established crested wheatgrass may restrict establishment of other species. The ecological integrity sites seeded in the 1960s and 1970s with primarily crested wheatgrass is low, especially over large areas, where there are few mosaics of other plant communities, little diversity of wildlife species that use these communities, and disruption of corridors for animal movement. GRSG use of these crested wheatgrass monoculture seedings is believed to be very limited.

Riparian Areas and Wetlands

Conditions on BLM-administered land are similar to conditions in the planning area as a whole, described in the previous section.

Other

The Other category includes a variety of vegetation types that do not serve as GRSG habitat. These include salt desert shrub, mountain shrubland, lava fields and sand dunes, alpine grasslands, quaking aspen woodlands, and tree- or shrub-dominated riparian and wetland areas. Of these vegetation types, the most extensive type is salt desert shrub. GRSG use of these areas is generally low or believed to be low.

Special Status Plants

The BLM's policy for special status plant species is to conserve and recover threatened and endangered species and the ecosystems on which they depend

so that ESA protections are no longer needed, and to initiate proactive conservation measures that reduce or eliminate threats to BLM sensitive species to minimize the likelihood of and need for listing of these species under the ESA. The BLM 6840 Manual, Special Status Species Management (BLM 2008c), sets policy for the management of candidate species and habitat. BLM sensitive species include candidate species for ESA listing, including GRSG. The 6840 manual directs the BLM to conserve special status species and the ecosystems on which they depend on BLM-administered land and reduce the likelihood and need for future listing under the ESA. It also directs the BLM to undertake conservation actions for such species before listing is warranted and to "work cooperatively with other agencies, organizations, governments, and interested parties for the conservation of sensitive species and their habitats to meet agreed on species and habitat management goals."

The BLM 6840 manual requires the BLM to identify strategies, restrictions and management actions necessary to conserve and recover listed species and provide provisions to conserve BLM sensitive species when the engaging in the planning process and developing LUPs and implementation plans. It also requires managers to determine, to the extent practicable, the distribution, abundance, population condition, current threats, and habitat needs for sensitive species, and to evaluate the significance of actions in conserving those species.

In Oregon, besides threatened, endangered, and sensitive species, the State Director has also designated strategic species (BLM 2012e). While these species are not special status species for management purposes per BLM Manual 6840, they are uncommon and sensitive species tracked by the Oregon Heritage program (ORBIC 2012) that do not meet the BLM criteria to be classified as sensitive.

There are 115 known species of special status mosses, lichens and vascular plants occurring on BLM-administered lands, and another 70 species suspected to occur based on proximity to known populations on adjacent available habitat (BLM 2012e; Oregon Plant Atlas 2012; ORBIC 2012). There are 13 known occurrences of BLM strategic species (**Appendix K**).

The Burns District has one federally endangered plant, Malheur wirelettuce (*Stephanomeria malheurensis*) and the Baker Resource area on the Vale District has populations of the federally threatened Spalding's catchfly (*Silene spaldingii*). Within the Vale District on adjacent private land, populations of the listed threatened Howell's spectacular thelypody (*Thelypodium howellii* ssp. *spectablis*) occur, however no extant populations have been found on federal lands to date.

Botanical inventories across the range of the GRSG in Oregon are incomplete, and what is presented in **Appendix K** represents the best available information for known occurrences of BLM special status plants. Vast areas of habitat have not had botanical inventories within the over 13 million acres of the 4 districts.

Most species on the BLM sensitive plant lists that are documented within the planning area are known from a small number of occurrences, usually with small population sizes, occupying small acreage in suitable habitat (BLM 2012e). Many of these species are poorly understood, with few (if any) studies documenting the species' biology, ecology, and population characteristics. These sensitive plants are not evenly or predictably distributed across the landscape, and tend occur in patchy, clumped distributions associated with suitable habitat. Within eastern Oregon, a majority of the BLM sensitive plants are endemics confined to a very limited range or to specific plant communities or unique soil types. Even sensitive plants that have known specialized habitat needs are often not present within specialized habitats; unoccupied suitable habitat is common.

To date, BLM special status plants have been documented on about 39,805 acres within the planning area, of which 14,755 acres (37 percent) are within PPH and 9,210 acres (23 percent) within PGH (BLM 2012e). Overall, BLM special status plant species are documented to occur on a very small percentage of the landscape, less than 0.3 percent of PPH and PGH combined. However, a large percentage of the landscape has not had botanical surveys targeting sensitive plants; it is likely that future pre-disturbance surveys for BLM projects will document more populations. Many of these sensitive plant species are associated with sagebrush habitats that also support GRSG.

3.3.2 Trends

Sagebrush Steppe

Statewide, acres of habitat for GRSG in Oregon have declined by 21 percent from estimated acres of habitat prior to 1850, with most of the decline in the Columbia Basin (Hagen 2011). Juniper encroachment is expected to continue at a faster rate than treatment. The spread of exotic invasive plant species is mainly facilitated by wild fires with lesser causal factors being drought and other physical disturbance factors. The current aroga moth (*Aroga websteri*) outbreak reached epidemic levels in 2012, primarily affecting the Warm-Dry Sagebrush Steppe; however, recent monitoring has found that the aroga moth is affecting all of the most common species of sage at a large variety of elevations and habitat types. When the outbreak began is unclear, but it may have begun in the mid-2000s with observed smaller scale outbreaks in northern Nevada (Bentz et al. 2008) and eastern Oregon. In some locations, the population peak has lasted for 3 years. Past aroga moth outbreaks typically resulted in partial crown mortality in sagebrush and scattered complete mortality. However, the scale and duration of the current outbreak is believed to greatly exceed the smaller outbreaks of the recent past. The last outbreak at the current scale occurred in the mid-1960s (Hall 1965). Frequent or extensive defoliation can cause sagebrush mortality (Hall 1965), although the degree of mortality from the current outbreak is not yet known. The observed impacts on sagebrush foliage are believed to be a factor in the scale of wildfires on the Burns and Vale Districts during the summer of 2012.

Invasive Plants

Some actions and events have altered the historic range of native species composition, structure, and distribution across the landscape, which has allowed weeds to invade and establish themselves. Under current management, the BLM estimates that noxious weeds on BLM-administered lands in Oregon are spreading at an annual rate of 12 percent, far exceeding the rate of treatment (BLM 2010a). Preliminary analyses for District-level herbicide environmental documents indicate the fastest spreading invasive species are dalmation toadflax (*Linaria dalmatica*), thistles and knapweeds, invasive plant species, and whitetop (*Cardaria* spp.). Many of these noxious weed species are within the three-mile lek buffers and invasive plant spread into leks and surrounding brood-rearing habitat is of concern. Increasing weed populations in these locations could degrade suitable habitat.

Changing climate in combination with changing land uses and increased global commerce may be assisting plant invasions (Bradley et al. 2010). For example, increasing atmospheric carbon dioxide concentrations appear to favor invasive plant species and yellow star thistle at the expense of native species (Mayeux et al. 1994; Meyer et al. 2001; Ziska et al. 2005; Jessup and Anderson 2007; Bradley et al. 2010; Dukes et al. 2011). Interactions between increasing atmospheric carbon dioxide and changing temperature and precipitation regimes are complex and may favor some invasive species while disfavoring others (Bradley et al. 2010). The effects of climate change, including changing atmospheric carbon dioxide concentrations, remain largely unknown for most invasive species as well as for most herbaceous native species.

In addition, recreational use is expected to continue to grow throughout the planning area (as described in **Section 3.8**, Recreation), and ongoing natural events such as wildfires, will likely increase the potential for weed introduction and establishment across the planning area. Since most invasive species are well-adapted to exploit recently burned areas, any increases in average fire size or the frequency of fires is of particular concern. See **Section 3.6**, Wildland Fire Management, for more detail on trends in wildfires. The current aroga moth outbreak may also favor invasive species where higher sagebrush mortality occurs in formerly dense stands with sparse native understories and invasive plants already present.

Juniper Woodland

Most of the current vegetation treatments are focused on reducing juniper; however, current treatment rates appear to be lower than the current expansion rate, based on field observations. Comparing Forest Service juniper assessments suggests that the extent of juniper has declined within the Brothers/La Pine and Upper Deschutes RMP areas (Gedney et al. 1999; Azuma et al. 2005). These declines are likely due to displacement by other conifers and human population growth and subsequent development. These same assessments indicate continued increase of juniper in the remainder of the

planning area, but the greatest increases over the last 60 years have been within the Baker and Southeastern Oregon RMP boundaries (Gedney et al. 1999; Azuma et al. 2005). Continued fire exclusion, increases in atmospheric carbon dioxide concentrations, and biological inertia are thought to be the primary causes (Soulé and Knapp 1998; Knapp et al. 2001; Soulé et al. 2004).

The expansion of juniper woodland is likely to continue. The presence of seedlings in juniper savannas suggests that juniper is still in an establishment stage, and that the probability of these lands continuing to increase in tree density is larger than for areas that have a single old juniper standing on it. Juniper woodland is also expected to continue to develop in suitable areas that currently lack juniper. Gedney et al. (1999) speculated there might be as much as 6 million acres of juniper woodland and savanna in the future, assuming no additional changes in current conditions.

Crested Wheatgrass Seedings

Due to its demonstrated ability to compete, crested wheatgrass continues to be one of the preferred species in rehabilitation efforts where invasive plant species are either known or expected to be a problem. However, most seed mixes now include native grasses and forbs as well. The conversion of sagebrush to crested wheatgrass monoculture seedings no longer occurs in sagebrush steppe and has not for many years. Sagebrush cover continues to increase at varying rates within existing seedings, but increases in native grasses and forbs remain limited. At present, little effort is expended on further manipulation of crested wheatgrass seedings due to limited resources and higher priorities for vegetation treatments, primarily of juniper expansion areas.

Riparian and Wetland

Proper functioning condition is a qualitative method of assessing the ecological integrity of a stream and its associated riparian vegetation. Streams rated as properly functioning or on an upward trend also should have characteristic riparian vegetation species mix. Of the stream miles assessed, 83 percent within designated PPH were rated as properly functioning or on an upward trend and only 8 percent as nonfunctional or on a downward trend. Within PGH, 82 percent of stream miles were rated as properly functioning or on an upward trend and 7 percent as nonfunctional or trending downward. Elsewhere, 75 percent of stream miles were rated as properly functioning or trending upward and 11 percent as nonfunctional or trending downward. Photo trend monitoring generally shows an increase in native riparian vegetation, including willows, sedges and rushes, as well as stream channel narrowing and deepening, and increases in streambank stability.

Special Status Plants

For the vast majority of BLM sensitive plants on the BLM special status species list, there is little quantitative trend data or formal monitoring of the number of individuals, demographic structure, seedbank viability, response to disturbance,

or changing climate. Monitoring of sensitive plant populations usually takes 10 years to fully understand population demographics, document population trends, and to observe annual fluctuations of populations due to climatic variability. Long-term monitoring has been cost prohibitive in the decision area for the majority of the BLM special status plants. Less than 10 percent of the sensitive plants have had any long-term, statistically rigorous monitoring projects (Institute for Applied Ecology 2012; Meinke 2012). Much of what is known is observational, or monitoring that has been inconsistent, incomplete, or at only a few locations. In most cases, any documented species trends are variable (i.e., some populations stable, some increasing, or some decreasing).

BLM sensitive plants can be affected by a number of factors. The biggest factors are activities that result in direct physical impacts on plants and occupied habitat. Schemske et al. (1994) listed the top six threats to sensitive plants as 1) development; 2) grazing; 3) collecting; 4) water control; 5) oil, gas, and mining; and 6) trampling. Wilcove et al. (1998) at a coarse scale identified habitat destruction and alien species invasion as the greatest threats and within habitat destruction (finer scale), listed: land conversion (development), agriculture, livestock grazing, outdoor recreation, and disruption of the fire ecology as the greatest threats to sensitive plants. Kaye and Meinke (1997) identified the major threats to sensitive plant species for Oregon with a similar list. The list of threats seems to be directly correlated with land use patterns, with development (including agriculture), logging, livestock grazing, and recreation as the most significant threats to sensitive plants. All of these threats are occurring in Oregon to some degree and likely indicate a declining trend in prevalence of special status plant species over time. Ground-disturbing activities such as energy development, power-line ROW construction, road construction and maintenance, rock, sand and gravel operations, and mining can directly impact populations by physical removal of the plants and soil, destruction of seed banks, habitat alteration and fragmentation. As patch sizes for most populations are very small, the physical destruction of an occupied patch can have deleterious consequences for a population.

Direct herbivory from insects, rodents, native ungulates, and livestock has also been documented on sensitive plants (Newton et al. 2010; Gisler and Kaye 2004). Direct impacts on sensitive plant populations from livestock grazing have been documented, especially from trampling of plants in high use area.

OHV recreation can cause direct destruction of sensitive plants and the general habitat in high use and play areas. Direct impacts on plants can also occur from fuel treatments (slashing, pile burns) and juniper removal, if physical impacts occur within occupied habitats. Wildfire suppression can also physically affect plants and habitat, causing impacts from bulldozers and hand crews. However, known sensitive plant populations are identified during or preceding fire incidents and are avoided where such actions do not compromise life and safety.

Other impacts on sensitive plants are indirect. The introduction and spread of invasive, non-native species from disturbance can increase competition with sensitive plants for space, light, water, and nutrients. Water especially can be a limiting factor in the Great Basin, and many weeds are better competitors for this limited resource, sending down deep tap roots or forming large monocultures. Cheatgrass and other invasive plant species have drastically altered the intensity, frequency, and duration of wildfire, which is affecting the sagebrush ecosystem in which many sensitive plants occur. These fires can displace native vegetation and create monocultures of invasive plant species over large areas (Runyon et al. 2012). Disturbance, especially at large scales, can also affect the native pollinator populations (native butterflies, bees, flies, and ants) on which many plants depend. The current understanding of these pollinator interactions on sensitive plants is largely unknown, as few studies have occurred and observations have been largely anecdotal.

A significant existing and potential threat to sensitive plants is climate change. Many special status plants have limited distributions, a low number of sites, small population sizes, and likely lack resilience in response to changing climate and habitat conditions. Under future climate scenarios, sensitive plants can migrate to habitats for which they are better adapted, adapt to the changing environment in their natural or original place, or go extinct (Hawkins et al. 2008). It is estimated that sensitive plants in Oregon comprise between 5 and 15 percent of the known flora of Oregon (Kaye and Meinke 1997). It is likely, given the number of endemics in eastern Oregon, that this figure is true for eastern Oregon as well, although the exact number of plant species documented in the analysis area has not been determined.

The altered future climate may favor other, more common, plant species, particularly invasive and noxious weeds, that may be better adapted to the altered climate or have wider ecological tolerances, outcompeting sensitive native plants and potentially leading to their extinction.

The listed threats to sensitive plants do not act in isolation, but combine at different levels in different areas at different times. The cumulative impacts of these threats combined with climate change on sensitive BLM special status plants may be leading to increasing rarity for these species in Oregon and extirpation or extinction for narrow endemics.

3.4 FISH AND WILDLIFE

General Wildlife

The BLM has broad responsibility to the public under the Federal Land Policy and Management Act (FLPMA), and other acts and presidential orders to maintain and improve the habitat for wildlife. While the BLM conducts habitat inventories, monitoring, protection, restoration, and development activities, FLPMA specifically reserved some responsibilities, particularly managing the

wildlife itself (e.g., hunting regulations, wildlife damage control, and translocations/re-introductions) for the individual states (43 USC 1732), in this case the ODFW.

The following summaries briefly explain federal laws, policies, and orders relevant to BLM's management of general wildlife (see **Section 3.4.2**, Special Status Wildlife, for guidance relevant to BLM sensitive and federally listed species).

- FLPMA – The FLPMA directs the BLM to establish goals and objectives as guidelines for public land use planning "on the basis of multiple use and sustained yield unless otherwise specified by law." In addition, FLPMA mandates that the BLM manage "public lands in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric water resources, and archeological values; that, where appropriate, [the BLM] will preserve and protect certain public lands in their natural condition; [and] that [the BLM] will provide food and habitat for fish and wildlife …"
- Migratory Bird Treaty Act (MBTA) – The Migratory Bird Treaty Act (MBTA) of 1918, as amended, implements various treaties and conventions between the US, Canada, Japan, Mexico and the former Soviet Union for the protection of migratory birds. Under the act, it is unlawful to pursue, hunt, take, capture (or kill) a migratory bird except as permitted by regulation (16 USC 703-704). The regulations at 50 CFR 21.11 prohibit the take, possession, import, export, transport, sale, purchase, barter, or offering of these activities, or possessing migratory birds, including nests and eggs, except under a valid permit or as permitted in the implementing regulations (Director's Order No. 131). A migratory bird is any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual life cycle.
  - The USFWS is the lead federal agency for managing and conserving migratory birds in the US; however, under Executive Order 13186, all other federal agencies are charged with the conservation and protection of migratory birds and the habitats on which they depend. In response to this order, the BLM and Forest Service have implemented management guidelines that direct migratory birds to be addressed in the NEPA process when actions have the potential to negatively or positively affect migratory bird species of concern.
- Memorandum of Understanding (MOU) – The purpose of the MOU is, "to strengthen migratory bird conservation by identifying and

implementing strategies that promote conservation and avoid or minimize adverse impacts on migratory birds through enhanced collaboration between the BLM and the Fish and Wildlife Service and in coordination with state, tribal, and local governments." Following are provisions of the MOU that relate specifically to planning and NEPA compliance.

- The BLM shall:
  - Maintain or update current policy guidance regarding management of migratory birds and their habitat pursuant to the MBTA and Executive Order 13186.
  - Address the conservation of migratory bird habitat and populations when developing, amending, or revising management plans for BLM-administered lands, consistent with the FLPMA, ESA, and other applicable law. When developing the list of species to be considered in the planning process, the BLM will consult the current (updated every 5 years) USFWS Species of Concern lists.
  - At the project level, evaluate the effects of the BLM's actions on migratory birds during the NEPA process, if any, and identify where take reasonably attributable to agency actions may have a measurable negative effect on migratory bird populations, focusing first on species of concern, priority habitats, and key risk factors. In such situations, the BLM will implement approaches lessening such take.
  - Work with federal and non-federal partners such as the Strategic Habitat Conservation partnership and Joint Ventures to integrate migratory bird and habitat conservation into BLM planning efforts.
  - Integrate migratory bird conservation measures, as applicable, into future activity management planning (e.g., grazing, recreation, cultural resources, and wildlife), surface operating standards and guidelines for oil and gas exploration and development, and renewable (wind, solar, and geothermal) energy development NEPA mitigation. This will address habitat loss and minimize negative impacts.

- Bald Eagle Protection Act – The Act, as amended, provides for the protection of the bald eagle and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession and

commerce of such birds. By policy, the BLM will not issue a notice to proceed for any project that is likely to result in take of bald eagles and/or golden eagles until the applicant completes its obligation under applicable requirements of the Act, including completion of any required procedure for coordination with the USFWS or any required permit (WO-IM-2010-156).

- Executive Order 13443 – Facilitation of Hunting Heritage and Wildlife Conservation direct federal agencies that have programs and activities that have a measurable effect on public land management, outdoor recreation, and wildlife management to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.

It is BLM's policy, under BLM Manual 6500 – Fish and Wildlife Conservation, to sustain fish and wildlife resources on BLM-administered lands. To carry out this policy, the BLM must manage public lands in a manner that will "provide food and habitat for fish and wildlife" (FLPMA 102(8)). Through the planning process, the BLM must consider and address how to provide habitat of sufficient quantity and quality to meet species' life history needs to sustain populations. In the development and implementation of RMPs, the BLM must consider fish and wildlife resources, including associated habitats, with the same level of consideration given to other resources and uses of BLM-administered lands. Fish and wildlife habitat includes all elements of a wild animal's environment which the animal needs to naturally complete its life cycle including to maintain a healthy life and perpetuate its population through normal reproduction; these elements are usually described as food, cover, water and living space; and are required in the amounts, qualities, and locations that an animal needs to complete its life cycle.

Manual 6500 further directs the BLM to identify priority species and/or habitats within the planning area. A priority species is one having unique importance for its ecological, recreational, social, cultural, or economic value that warrants special consideration in management and land-use planning decisions. Quantifiable habitat goals (e.g., acres of habitat) are established during the land use planning process for these species and are informed by regional and local habitat assessments, State Wildlife Action Plans, or other appropriate sources. Therefore, the following affected environment section focuses on those wildlife species considered to be priority species.

Special Status Species

The BLM's policy for special status species is to conserve and recover threatened and endangered species and the ecosystems on which they depend so that ESA protections are no longer needed, and to initiate proactive conservation measures that reduce or eliminate threats to BLM sensitive species to minimize the likelihood of and need for listing of these species under the ESA. The BLM Manual 6840, Special Status Species Management (BLM 2008c),

sets policy for the management of candidate species and their habitat. BLM sensitive species include candidate species for ESA listing, including GRSG. BLM Manual 6840 directs the BLM to conserve special status species and the ecosystems on which they depend on BLM-administered land and reduce the likelihood and need for future listing under the ESA. BLM Manual 6840 also directs the BLM to undertake conservation actions for such species before listing is warranted and also to "work cooperatively with other agencies, organizations, governments, and interested parties for the conservation of sensitive species and their habitats to meet agreed on species and habitat management goals."

BLM Manual 6840 requires that the BLM identify strategies, restrictions and management actions necessary to conserve and recover listed species and provide provisions to conserve BLM sensitive species when the BLM engages in the planning process, LUPs, and implementation plans. BLM Manual 6840 also requires managers to determine, to the extent practicable, the distribution, abundance, population condition, current threats, and habitat needs for sensitive species, and to evaluate the significance of actions in conserving those species.

In Oregon, the State BLM Director has designated another category of rare species called strategic species (BLM 2012e). While these species are not special status species for management purposes per BLM Manual 6840, they are uncommon and rare species. These species are tracked by the Oregon Heritage program (ORBIC 2012), but do not meet the BLM criteria to be classified as sensitive. Strategic species are ones that are often poorly understood, have taxonomic uncertainty, and are formerly sensitive species that are still tracked. **Appendix L**, Special Status Species contains a list of special status species for the planning area.

3.4.1 Existing Conditions

Fisheries and Aquatic Wildlife

Fisheries and aquatic habitat in the planning area include perennial and intermittent streams, springs, lakes, and reservoirs that support fish through at least a portion of the year.

The Great Basin portion of the planning area is found in south-central Oregon and covers most of Lake and Harney counties. Streams in this area never reach the ocean, but are instead confined, typically resulting in terminal lakes, marshes, or sinks that are saline. The fish in this area are adapted to extreme conditions. Trout are found in lakes and streams at all elevations within the Great Basin in Oregon (Sigler and Sigler 1987).

Stream systems occurring in the planning area outside the Great Basin drain into the John Day River and Snake River. The climate is generally arid, and annual runoff patterns tend to be dominated by annual spring snowmelt. Summer flows are provided by snowmelt, subsurface storage, and thunderstorm events. Native

fish species are generally redband trout (*Oncorhynchus mykiss*), speckled dace (*Rhinichthys osculus*), and sculpins. Other less common native fish species are also present.

Conditions within the Planning Area

The condition of fisheries and aquatic habitat is related to hydrologic conditions of the upland and riparian areas associated with, or contributing to, a specific stream or waterbody, and to stream channel characteristics. Riparian vegetation reduces solar radiation by providing shade and thereby moderates water temperatures, adds structure to the banks to reduce erosion, provides overhead cover for fish, and provides organic material, which is a food source for macroinvertebrates. Intact vegetated floodplains dissipate stream energy, store water for later release, and provide rearing areas for juvenile fish. Water quality (especially factors such as temperature, sediment, and dissolved oxygen) also greatly affects fisheries and aquatic habitat.

Fish and aquatic habitat on BLM-administered lands within the planning area includes approximately 1,237 miles of fish-bearing streams (**Table 3-10**, Summary of Greater Sage-Grouse Habitat Containing Fish-Bearing Stream Miles on BLM-Administered Lands), and 209,760 surface acres of lakes, ponds and reservoirs (**Table 3-11**, Summary of Greater Sage-Grouse Habitat Containing Perennial Lake, Pond, and Reservoir Fish Habitat on BLM-Administered Lands). Currently, these aquatic systems support a variety of game and non-game fish species.

Table 3-10
Summary of Greater Sage-Grouse Habitat Containing Fish-Bearing Stream Miles on BLM-Administered Lands

Sage-Grouse Habitat	Stream Miles
Preliminary Priority Habitat (PPH)	383.84
Preliminary General Habitat (PGH)	339.57
Outside Sage-Grouse Habitat	513.92

Source: Oregon/Washington BLM 2013

Table 3-11
Summary of Greater Sage-Grouse Habitat Containing Perennial Lake, Pond, and Reservoir Fish Habitat on BLM-Administered Lands

Sage-Grouse Habitat	Fish Habitat (acres)
Preliminary Priority Habitat (PPH)	10,550
Preliminary General Habitat (PGH)	19,030
Outside Sage-Grouse Habitat	180,180

Source: Oregon/Washington BLM 2013

BLM-administered land provides habitat for 24 native and 4 non-native fish species, 6 of which are federally protected under the ESA (**Table 3-12**, Fish Species or Subspecies on BLM-Administered Lands within the Planning Area).

Table 3-12
Fish Species or Subspecies on BLM-Administered Lands within the Planning Area

Common Name	Scientific Name	Status		
		BLM[1]	Federal[2]	Native
Borax Lake chub	*Gila boraxobius*		E	X
Bull trout	*Salvelinus confluentus*		T	X
Foskett speckled dace	*Rhinichthys osculus* spp.		T	X
Hutton tui chub	*Gila bicolor ssp.*		T	X
Lahontan cutthroat trout	*Oncorhynclus clarki henshawi*		T	X
Warner sucker	*Catostomus warnerensis*		T	X
Catlow tui chub	*Gila bicolor* spp.	Sensitive	S	X
Redband trout	*Oncorhynchus mykiss*	Sensitive	S	X
Alvord chub	*Gila alvordensis*	Assessment		X
Bridgelip sucker	*Catostomus columbianus*			X
Lahontan redside shiner	*Richardsonius egregius*	Sensitive		X
Largescale sucker	*Catostomus macrocheilus*			X
Longnose dace	*Rhinichthys cataractae*			X
Malheur mottled sculpin	*Cottus bairdi* ssp.	Sensitive		X
Mountain whitefish	*Prosopium williamsoni*			X
Mountain sucker	*Catostomus platyrnynchus*			X
Oregon Lakes tui chub	*Gila bicolor oregonensis*	Sensitive		X
Pit brook lamprey	*Lampetra lethophaga*			X
Redside shiner	*Richardsonium balteatus*			X
Sheldon tui chub	*Gila bicolor eurysoma*	Sensitive		X
Speckled dace	*Rhinichthys osculus*			X
Summer Basin tui chub	*Gila bicolor* ssp.	Sensitive		X
Tahoe sucker	*Catostomus tahoensis*	Sensitive		X
Warner Basin tui chub	*Gila bicolor* ssp.	Strategic		X
Brook trout	*Salvelinus fontinalis*			
Brown trout	*Salmo trutta*			
Rainbow trout, generic	*Oncorhynchus mykiss*			
Smallmouth bass	*Micropterus dolomieu*			
Common carp	*Cyprinus carpio*			

[1] BLM status per BLM 2012e
[2] Federal Status (USFWS): E-endangered; T-threatened; S-Species of special concern with conservation agreements.

The most significant group of native fishes found in the planning area, in terms of their ecological, cultural, and commercial importance, is the salmonid family. All members of this group, which includes trout, require relatively pristine, cold freshwater habitats during part or all of their life cycles and, as such, depend greatly on the conditions of the surrounding forests and rangelands to ensure their survival (Meehan 1991).

Lahontan cutthroat trout

Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), historically inhabited most cold waters of the Lahontan Basin of Nevada, California, and extreme southeastern Oregon (Behnke 1979). The species currently occurs only within the Burns District within the planning area.

Lahontan cutthroat trout were originally listed as endangered by the USFWS in 1970 (USFWS 2013b). It was reclassified as threatened in July of 1975 (USFWS 2013b). A recovery plan was published in 1995 (USFWS 2013b). All Lahontan cutthroat trout populations within the Burns District are considered as out of basin, transplanted populations; however, they retain their protections under the ESA.

In 1971, 1976, and 1980, ODFW biologists introduced Lahontan cutthroat trout from Willow and Whitehorse Creeks in Malheur County, Oregon, into nine streams in the Burns District. Steep gradients, erratic and high seasonal flows, and presence of few pools appear to limit the distribution and abundance of Lahontan cutthroat trout introduced into these streams. Habitat availability is generally limited to a few miles per stream due to upstream gradient and downstream loss of surface flow. The current condition of Lahontan cutthroat trout populations in these systems is not known, but given the lack of disturbance since a 2004 genetics study that found Lahontan cutthroat trout in all seven streams, it is expected that the populations have remained intact.

Bull trout

The coterminous US population of the bull trout (*Salvelinus confluentus*) was listed as threatened on November 1, 1999 (USFWS 2012a). Critical habitat was designated on October 26, 2005 (USFWS 2012a); however, the 2005 USFWS final rule designating Critical Habitat for bull trout did not include BLM-administered land until 2010 when the USFWS added the Oregon-Washington BLM administrative units (USFWS 2010b). A recovery plan was drafted in 2005 and has not been finalized.

The Malheur River Basin Critical Habitat Unit is in eastern Oregon within Grant, Baker, Harney, and Malheur Counties. A total of 169 miles (272 kilometers) of streams and 1,769 acres (716 hectares) of reservoir surface area are designated as critical habitat. In the Burns District, occupied bull trout habitat is restricted to the Malheur River in the area north of Highway 20 to the Malheur National Forest boundary. This area is considered migration/overwintering/foraging habitat (USFWS 2010c). Approximately 2.5 miles of this segment of the Malheur River and riparian habitat are under BLM-administration; the remainder is private. The BLM-administered land portion is functionally excluded from grazing by fences, channel characteristics (boulder substrate), topography, and river flows (adjacent lands grazed in spring during high flow periods).

Due to their need for clear and very cold waters and a long incubation time, bull trout are more sensitive to increased water temperatures, poor water quality and degraded stream habitat than many other salmonids. Throughout its range, the bull trout is threatened by the combined effects of habitat degradation, fragmentation, and alterations associated with dewatering; road construction and maintenance; mining; grazing; the blockage of migratory corridors by dams or other diversion structures; poor water quality; incidental angler harvest; entrainment (a process by which aquatic organisms are pulled through a diversion or other device) into diversion channels; and introduced non-native species (USFWS 1999).

Borax Lake chub

Borax Lake chub (*Gila boraxobius*), a federal endangered species, is endemic to Borax Lake, Lower Borax Lake, and the connecting waterways located in the northern end of Pueblo Valley approximately six miles northeast of the town of Fields, Oregon, in southern Harney County. Because of its highly restricted distribution, dependence on a single water source, and perched topographic position, and existing threats to their fragile habitat, the Borax Lake chub is vulnerable to catastrophic loss. The thermal waters feeding Borax Lake face a long-term threat from geothermal energy development. Proposals to drill wells near the lake prompted an emergency listing of this species as endangered in 1980. Other threats include modification of the lakes fragile shorelines, which could easily divert water away from the lake, and overgrazing by livestock. The fragile salt-crust shoreline of the lake also is easily damaged by off-road vehicle use. The area is currently fenced to exclude livestock. The Borax Lake chub was emergency-listed as endangered in 1980; a final listing rule with critical habitat was published in 1982, and a recovery plan was published in 1987 (USFWS 2013c).

In response to the listing of the species, the BLM designated 520 acres of BLM-administered land surrounding Borax Lake in 1983 as an ACEC. In 1987, the USFWS designated 640 acres of the area surrounding Borax Lake as critical habitat. Two 160-acre inholdings, encompassing Borax Lake and portions of the spring complex north of the lake, have been privately owned since their purchase in 1993 by The Nature Conservancy.

Redband trout

Redband trout occupy a wide array of habitats (USFWS 2009a) and are found throughout the planning area. Distribution of redband trout varies according to water year and annual fluctuation of instream flow. Where suitable habitat and water flow are available, redband trout are likely to be present (ODFW 2005). Populations found in the southern Oregon deserts inhabit turbid and alkaline waters that range from near freezing to over 77 degrees Fahrenheit (°F; Kunkel 1976; USFWS 2009a). Redband trout tolerate warmer waters than many other salmonids (Gamperl et al. 2002); however, in warmer and drier environments

the loss of riparian cover has been associated with reduced numbers and production of fish (Tait et al. 1994).

Redband trout are considered a species of special concern by the American Fisheries Society and all states in the historical range, and are classified as a tracking species by the BLM (Williams et al. 1989). Six Great Basin populations, including populations in the planning area, were petitioned for listing as threatened or endangered under the ESA in 1997. The USFWS grouped the six populations a single Distinct Population Segment, and in 2000, the USFWS found that listing for these populations is not currently warranted (USFWS 2009a). This determination was based in part upon evidence of moderate to high densities of redband trout in each of the six subbasins (Dambacher et al. 2001).

Warner Sucker

Warner suckers (*Catostomus warnerensis*) are endemic to the Warner Valley and were listed as a threatened species in 1985 (USFWS 2013d). There are 43 miles of designated critical habitat in the planning area, including 13.5 miles of designated habitat on BLM-administered lands.

A recovery plan for the Warner sucker was approved in 1998 (USFWS 2013d). Many of the actions required to remove the species from listing, such as screening and providing passage over irrigation diversions, are needed on private lands and are beyond the scope of this plan. The BLM has worked on determining the population status of the species to establish the self-sustaining meta-population requirements of the plan. The BLM has also worked to identify existing habitats, assess their quality, and improve habitats by managing and excluding livestock.

Foskett Speckled Dace

The Foskett speckled dace (*Rhinichthys osculus* ssp.), listed as threatened in 1985 (USFWS 2013e), occurs in a spring on BLM-administered land in Coleman Valley. The BLM acquired this land in an exchange with the private land owner and has maintained livestock exclusion on the spring area. A habitat creation project was completed in 2009 and fish were moved into the habitat in 2010 in order to establish fish in an adjacent spring (Dace Spring), as recommended in the recovery plan (USFWS 1998). Successful reproduction has been documented at the Dace Spring site. Work, as outlined in the recovery plan (USFWS 1998), is planned to enhance the existing dace habitat through the promotion of open water habitat at Foskett Spring.

Nonnative Fish

Several nonnative fish have been introduced into the planning area. Most of the nonnative species have been introduced to promote sport fishing opportunities, though some were introduced illegally. Introduced salmonids (such as hatchery-raised rainbow trout [*Oncorhynchus mykiss*] and brown trout [*Salmo trutta*]), and centrarchids (such as bass and sunfish) now support many, if not most, of the nonnative sport fishing opportunities within this region. ODFW no longer

routinely stocks warm water fish species, but largemouth bass (*Micropterus salmoides*), black crappie (*Pomoxis nigromaculatus*), white crappie (*P. annularis*), and brown bullhead (*Ameiurus nebulosus*) have become established from previous introductions in the lakes and some smaller reservoirs. Invasive common carp (*Cyprinus carpio*) uproot and destroy submerged aquatic vegetation and increase water turbidity (WDFW 2013). Carp populations in the Malheur National Wildlife Refuge have increased exponentially since their introduction in the 1950s which has led to substantial reductions in waterfowl habitat and use (USFWS 2012b). Anglers have illegally introduced these species in other reservoirs in the planning area.

Other Aquatic Species

Amphibians and aquatic invertebrates are integral components of the fish community. One amphibian, the Columbia spotted frog (*Rana lutiventris*), is a candidate for federal listing. Other fish of concern, because of limited habitat and range, include the Alvord chub (*Gila alvordensis*) and Catlow tui chub (*Siphateles bicolor* ssp.).

Alvord chub

Alvord chub are a rare cyprinid fish endemic to the Alvord Basin of southeastern Oregon and northwestern Nevada. It is a moderately sized minnow that inhabits marshes, creeks, and springs with little or no current. Many populations are small and vulnerable to extirpation through habitat alteration, groundwater pumping, and competition with exotic fishes. The American Fisheries Society considers the Alvord chub to be a species of special concern (Williams et al. 1989), and it is a BLM assessment species.

The Alvord chub occurs in a wide variety of available habitats such as isolated springs, reservoirs, and lakes, and in the mid to lower elevation reaches of cool and warm water creeks in the Alvord basin. Williams and Williams (1981) reported Alvord chubs from 15 localities within the basin as well as locations within the basin extending into Nevada.

Catlow tui chub

The Catlow tui chub, a small- to medium-sized minnow, is a recognized though undescribed subspecies of the more widespread tui chub. Genetic analysis of the Catlow tui chub is underway at Oregon State University. Due to its restricted distribution and threats to remaining habitat, the subspecies is considered of special concern by the American Fisheries Society (Williams et al. 1989), and it is a BLM tracking species.

Historically, Catlow tui chubs occurred in three streams (Three Mile, Skull, and Home Creeks) that drain the west flank of the Catlow Rim and in Rock Creek along the western edge of Catlow Valley (Bills 1977; Kunkel 1976). The Catlow tui chub has a restricted range but appears to be locally abundant in streams and in Three Mile Reservoir. An exception is Rock Creek, where only a few were found in 1994. The limited distribution of the Catlow tui chub, as well as the

Catlow redband trout, prompted the "Catlow Redband Trout and Catlow Tui Chub Conservation Agreement" (USFWS 1997). This Conservation Agreement was entered into by the BLM, USFWS, Malheur NWR, ODFW, and a private land owner in order to expedite conservation measures needed for the recovery of the species.

Due to the Catlow tui chub's restricted distribution, disturbances such as drought and fire, and human land use practices, including livestock grazing, channelization and dewatering for irrigation, place populations at risk.

Columbia spotted frog

The population of Columbia spotted frogs outside the Great Basin distinct population segment in the planning area was removed as a federal candidate species in 2010 while the population within the Great Basin distinct population segment is still a federal candidate species. This species is known to occur throughout the planning area (USFWS 2009b).

Columbia spotted frogs are experiencing declines in some areas. Destruction of wetland habitat for agriculture and land development, alteration of natural springs, removal of beaver dams, the introduction of non-native fish, and livestock grazing are all possible threats to this species (NatureServe 2013).

The Great Basin population occurs in southwestern Idaho, southeastern Oregon, and Nevada. Currently, Columbia spotted frogs appear to be widely distributed throughout southwestern Idaho (mainly in Owyhee County) and eastern Oregon, but local populations within this general area appear to be isolated from each other by either natural or human induced habitat disruptions. The largest local population of Columbia spotted frogs in Oregon occurs in Malheur County in the Dry Creek drainage. All of the known local populations of Columbia spotted frogs in eastern Oregon appear to be functionally isolated (USFWS 2004).

Western toad

Western toads (*Anaxyrus boreas*) occur in a wide variety of habitats ranging from desert springs to mountain wetlands. They range into various upland habitats around ponds, lakes, reservoirs, and slow-moving rivers and streams; sometimes they move up to a few kilometers through uplands. Rapid losses and declines of this species have occurred in many populations across its range for unknown reasons, even in relatively pristine environments (NatureServe 2012).

Springsnails

Springsnails (e.g., *Pristinicola* spp., *Pyrgulopsis* spp.) occur in several springs scattered around the planning area. They tend to be endemic to the spring in which they occur. Some species have been described, but many others have yet to be identified as unique. New records of springsnails, reported by Hershler and Liu (2009), are distributed disjunctively among five small groups of springs in southeastern Oregon (Owyhee River near Three Forks, Rattlesnake Creek

drainage, Owyhee Spring area, lower Owyhee River, and Malheur River drainage). Modifications to springs that negatively impact springsnails include livestock grazing, recreational activities, diversion of water source, and introduction of nonnative or invasive species (Sada and Vinyard 2002). Since thermophilic springsnails are generally very rare and highly endemic, they are particularly sensitive to the above threats.

Big Game

Conditions within the Planning Area

The planning area hosts a wide variety of big game species including mule deer, pronghorn, and elk that use habitats associated with sagebrush steppe and riparian habitats. Other big game species that are found in these habitats but in lesser amounts include bighorn sheep, moose, and white-tailed deer. The planning area provides habitat for all seasonal use periods for mule deer, pronghorn, elk, bighorn sheep, and other species. These species are generally widespread across the entire planning area except bighorn sheep, which are closely associated with areas containing broken cliffs, rock outcrops, and canyons.

Mule deer are native to eastern Oregon. Winter habitat is found predominately in lower elevation areas; while summer habitat is common throughout eastern Oregon in areas varying from low elevation agricultural lands to high elevation mountain areas. Mule deer achieved maximum abundance during the 1950s and 1960s. Since then, mule deer have declined across the West and in Oregon. The most recent decline happened since the early 1990s and, though not fully understood, it is believed to be primarily due to the combined effects of habitat loss and drought. Historically, deer populations rebounded quickly after such climatic extremes. However, in recent years, survival of fawns has remained at depressed levels. Low fawn recruitment, severe winters, dry summers, changing predator/prey relationships, and increased habitat loss have pushed deer populations well below the statewide management objective of 347,400 mule deer established by the ODFW in 2005.

The ODFW launched its Mule Deer Initiative to bring mule deer numbers up to the population management objective (the number of animals considered compatible with habitat and primary land uses) in five wildlife management units in parts of eastern Oregon, including Heppner, Maury, Murderers Creek, Steens Mountain, and Warner. The following website is for Oregon's Mule Deer Initiative: http://www.dfw.state.or.us/resources/hunting/big_game/mule_deer/MDI.asp.

Mule deer are primarily browsers, their diet is composed mostly of leaves and twigs of shrubs, especially during the winter. Grasses and forbs are also crucial components of their diet in the spring and summer. The quality and quantity of nutritious forage in spring (April to July) has major implications on the

production and survival of fawns. Summer-fall ranges are important because this is where deer produce fat reserves that will allow survival through winter. The quality of summer-fall forage also directly influences pregnancy and ovulation rates and, therefore, fawn production. Changes in mule deer habitats (reduced shrubs, increased invasive annual grasses and juniper) particularly on winter ranges, have likely reduced the ability of mule deer to survive unfavorable weather conditions, especially with a higher abundance of predators. Increasing levels of development and disturbance due to increases in human population have contributed to habitat fragmentation and decreased habitat effectiveness for mule deer.

Pronghorn numbers in Oregon steadily increased from an estimated 2,000 pronghorn during the 1920s to 8,950 by 1964 (Nelson 1925; Yoakum 1968), and continued to rise in the 1990s to between 13,000 and 15, 000. Pronghorn are established in much of Oregon east of the Cascade Range. They are usually considered denizens of open plains, but broad areas dominated by big sagebrush and intermittent lakes seem to form the primary habitats used in Oregon (Yoakum 2004). In sagebrush habitats, pronghorn diets consist of sagebrush and other shrubs during all seasons, but particularly in the fall and winter (Yoakum 2004). Forbs are preferred by pronghorn when available (Yoakum 2004). The availability of forbs may have important implications for pronghorn because they are rich in nutritional values required for reproduction (Pyrah 1987; Yoakum, 2004). Large landscape level fires have reduced the availability of sagebrush in parts of their range. In portions of the planning area extensive fencing has contributed to the inability of some populations to access otherwise suitable habitats. Predation of pronghorn fawns may be a factor limiting populations on marginal pronghorn rangelands or in areas where numbers of predators are high in relation to pronghorn numbers. Noxious weeds, improper livestock grazing, and drought has also impacted current pronghorn populations and their habitat.

During the great westward emigration along the Oregon Trail during the mid-1800s, Rocky Mountain elk were frequently seen by settlers in eastern Oregon (Bailey 1936). However, by the late 1880s, the combined effect of unregulated hunting, heavy livestock grazing, and tillage of native grasslands nearly caused the extirpation of Rocky Mountain elk in the Blue Mountains of Oregon (Irwin et al. 1994). In 1907, the total Rocky Mountain elk population in Oregon was estimated to be 200 head (Seton 1927). The remaining population in northeastern Oregon was augmented with Rocky Mountain elk from Jackson Hole, Wyoming and Yellowstone National Park in 1912 and 1913. Rocky Mountain elk numbers increased over the ensuing decades, and by 1976, the estimated Rocky mountain elk population for eastern Oregon was 60,000 head (Bryant and Maser 1982).

Rocky Mountain elk are found in the planning area in sagebrush steppe and associated conifer/forested woodlands. Rocky Mountain elk are considered generalists and are not totally dependent upon sagebrush steppe, but they do

require food, water, and, where hunted, hiding cover and security areas. The combination of the resources determines the distribution and number of Rocky Mountain elk within sagebrush steppe. Cow elk prefer rolling topography and riparian areas during the spring, especially during the calving period. Cow elk tend to increase the use of flat terrain as the season progresses. Peak use of flat terrain by cow and bull elk occurs in the fall.

Migratory Birds

Migratory birds are those that breed in the US and winter south of the border in Central and South America. Many of our well known passerine songbirds, flycatchers, vireos, swallows, thrushes, warblers, and hummingbirds, fall in this category. Most others are included in the resident category. Birds are a vital element of every terrestrial habitat in North America. Conserving habitat for birds will therefore contribute to meeting the needs of other wildlife and entire ecosystems. Continent wide declines in population trends for many avian species has developed into an international concern and led to the creation of the North American Bird Conservation Initiative (NABCI). Under this initiative, plans have been developed for the conservation of waterbirds, shorebirds, seabirds and landbirds.

The landbird initiative known as Partners-In-Flight has developed a series of bird conservation plans for every state. Partners-In-Flight has gained wide recognition as a leader in the landbird conservation arena. Partners-In-Flight Bird Conservation Regions are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues. Bird Conservation Regions are a hierarchical framework of nested ecological units delineated by the Commission for Environmental Cooperation (CEC). The overall goal of these Bird Conservation Regions is to accurately identify the migratory and resident bird species (beyond those already designated as federally threatened or endangered) that represent our highest conservation priorities by ecoregions. Bird Conservation Region lists are updated every 5 years by the USFWS.

Conditions within the Planning Area

Continental and local declines in numerous bird populations have led to concern for the future of migratory and resident songbirds. Reasons for these declines are complex. Habit loss, degradation, and fragmentation on breeding and wintering grounds and along migratory routes have been implicated for many species. Additional factors may include reproductive problems associated with nest predation, brood parasitism, and competition with exotic species. The vegetation of the Columbia Plateau has changed dramatically in the last 150 years since European settlement of the region. The loss and alteration of historic vegetation communities has impacted landbird habitats and resulted in species range reductions, population declines, and some local and regional extirpations. Native shrub-steppe communities have been diminished both in extent and condition. The principle factors were livestock overgrazing, invasion

and dominance of nonnative plants, and extensive conversion to agriculture (Wisdom et al. in press). Other contributing factors included development, sagebrush eradication programs, and changes in fire regimes (Paige and Ritter 1999). In eastern Washington, nearly 60 percent of the native shrub-steppe has been converted to agriculture (Dobler et al. 1996). Even in extant shrub-steppe, what appears to be a natural landscape dominated by an "ocean of sagebrush" is actually a considerably altered ecosystem that compositionally and functionally differs from prior conditions. These changes have had effects on wildlife species with many bird species continuing to decline long after the worst of the impacts on habitats have ceased.

While these losses are significant, perhaps of even more concern are changes that have occurred throughout the mostly sagebrush dominated ecosystem of the shrub-steppe. Grazing, exotic species, and altered fire regimes have impacted this ecosystem to the effect that it is difficult to find stands which are still in relatively natural condition. The greatest changes are the reduction of bunchgrass cover in the understory and an increase in sagebrush cover. Soil compaction is also a significant factor in heavily grazed lands affecting water percolation, runoff and soil nutrient content. Western juniper woodlands have greatly expanded their range, now occupying much more of the sagebrush ecosystem than prior to EuroAmerican contact. The reasons for the expansion are complex and include interactions between climate change and changing land use, but fire suppression and grazing have played a prominent role in this dramatic shift in structure and dominant vegetation.

In December, 2008, the USFWS released The Birds of Conservation Concern Report which identifies species, subspecies, and populations of migratory and resident birds not already designated as federally threatened or endangered that represent highest conservation priorities and are in need of additional conservation actions. While the bird species included in the Birds of Conservation Concern Report are priorities for conservation action, this list makes no finding with regard to whether they warrant consideration for ESA listing. The goal is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions. It is recommended that these lists be consulted in accordance with Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds." The following Bird Conservation Regions (**Table 3-13**, Bird Conservation Region 9, Avian Species List (Great Basin)) are within the Oregon Sub-region, however not all these species will be affected by the plan activities. Those that have potential negative or positive effects will be discussed in Chapter 4.

The Conservation Strategies for Landbirds in the Northern Rocky Mountains of Eastern Oregon and Washington, and the Columbia Plateau of Eastern Washington and Oregon as well as the USFWS Birds of Conservation Concern species list for the project area were reviewed and incorporated into this

Table 3-13
Bird Conservation Region 9, Avian Species List (Great Basin)

Greater Sage-Grouse (Columbia Basin distinct population segment)[1]	Black-chinned Sparrow
Eared Grebe (non-breeding[4]) Black Swift	Sage Sparrow
Calliope Hummingbird	Tricolored Blackbird
Lewis's Woodpecker	Black Rosy-Finch
Williamson's Sapsucker	Bald Eagle[2]
White-headed Woodpecker	Ferruginous Hawk
Willow Flycatcher[3]	Golden Eagle
Loggerhead Shrike	Peregrine Falcon[2]
Pinyon Jay	Yellow Rail
Sage Thrasher	Snowy Plover[3]
Virginia's Warbler	Long-billed Curlew
Green-tailed Towhee	Marbled Godwit (non-breeding[4])
Brewer's Sparrow	Yellow-billed Cuckoo (with US distinct population segment)
	Flammulated Owl

[1]ESA candidate
[2]ESA delisted
[3]non-listed subspecies or population of Tor E species
[4]non-breeding in this Bird Conservation Region.

analysis. Those species and habitats that are within the project area are incorporated and effects disclosed later in this document. **Table 3-14** displays the full list of Birds of Conservation Concern in the planning area. **Table 3-14**, Bird Conservation Region 9 (Great Basin, US portion only), shows the species that are known or likely to be present in the planning area and could be affected by the proposed actions.

Table 3-14
Bird Conservation Region 9 (Great Basin, US portion only)

Bird Species	Preferred Habitat
Greater Sage-Grouse (Columbia Basin distinct population segment) [1]	Sagebrush obligate, found east of the Cascades. They require large expanses of sagebrush with healthy native understories of forbs.
Loggerhead Shrike	Inhabits grasslands, pastures with fence rows, agricultural fields, and sagebrush with scattered juniper and open woodlands. Requires elevated perches throughout for hunting and nesting.
Pinyon Jay	In Oregon, juniper, sagebrush, and scrub oak habitats.
Sage Thrasher	A sagebrush obligate dependent on large patches and expanses of sagebrush steppe and bitterbrush with shrub heights between 30 and 60 centimeters (12 to 24 feet) height. Prefers bare ground over grassy understories.

Table 3-14
Bird Conservation Region 9 (Great Basin, US portion only)

Bird Species	Preferred Habitat
Green-tailed Towhee	In Oregon, prefers vigorous shrub stands with high shrub species diversity interspersed with trees.
Brewer's Sparrow	A sagebrush obligate found in shrublands of contiguous big sagebrush, greasewood, rabbitbrush, and shadscale habitats.
Sage Sparrow	Found in southeast and central Oregon. Associated with semi-open evenly spaced shrubs 1 to 2 meters (3 to 6 feet) high in big sagebrush up to 6,800 feet.
Ferruginous Hawk	Occupy habitats with low tree densities and topographic relief in sagebrush plains of the high desert and bunchgrass prairies in the Blue Mountains.
Golden Eagle	Inhabits shrub-steppe, grassland, juniper, and open ponderosa pine and mixed conifer/deciduous habitats, preferring areas with open shrub component for foraging.

[1]ESA candidate

Other Special Status Species

Conditions within the Planning Area

The list of special status species for BLM-administered lands in Oregon includes mammals, birds, reptiles, amphibians, fish, invertebrates, and plants. There are 282 special status species documented to occur or suspected to occur in the planning area. Of these species, 11 are mammals, 27 are birds, 2 are reptiles, 7 are amphibians, 27 are fish, 21 are invertebrates, 1 is a fungus, and 186 are plants. In addition to special status species, the BLM State Director in Oregon lists 13 plants as strategic species (**Appendix K**). For a complete discussion regarding Special Status Plant species, see **Section 3.3**, Vegetation.

The proposed action will occur largely in sagebrush habitat, as well as in areas of conifer encroachment (primarily juniper) targeted for sagebrush restoration to benefit GRSG. Therefore, only those species that depend on sagebrush habitat or that are strongly associated with juniper will be analyzed relative to the proposed action. **Table 3-15**, Special Status Species Documented or Suspected to Exist in on BLM-Administered Lands within the Planning Area, lists the animals and plants closely associated with sagebrush and/or juniper vegetation that are likely to occur within the BLM districts. For a list of special status plant species that have the potential to inhabit the planning area, see **Table 3-10**.

3.4.2 Trends

Fisheries and Aquatic Wildlife

Where certain fish populations have been identified as declining, they are a management concern. Threats to fish and aquatic species include reduced water

Table 3-15
Special Status Species Documented or Suspected to Exist in on BLM-Administered Lands within the Planning Area

Scientific Name	Common Name	Status	Occurrence Status by BLM District			
			Burns	Lakeview	Prineville	Vale
BIRD						
Ammodramus savannarum	Grasshopper Sparrow	S	D		D	D
Centrocercus urophasianus	Greater Sage-Grouse	S	D	D	D	D
Dolichonyx oryzivorus	Bobolink	S	D		S	D
Falco peregrinus anatum	American Peregrine Falcon	S	D	D	D	D
Haliaeetus leucocephalus	Bald Eagle	S	D	D	D	D
Tympanuchus phasianellus columbianus	Columbian Sharp-tailed Grouse	S				S
FISH						
Catostomus microps	Modoc Sucker	FE		S		
Catostomus tahoensis	Tahoe Sucker	S				D
Catostomus Warnerensis	Warner Sucker	FT		D		
Gila alvordensis	Alvord Chub	S	D			
Gila bicolor eurysoma	Sheldon Tui Chub	S		D		
Gila bicolor oregonensis	Oregon Lakes Tui Chub	S		D		
Gila bicolor ssp.	Catlow Tui Chub	S	D			
Gila bicolor ssp.	Hutton Tui Chub	FT		D		
Gila bicolor ssp.	Summer Basin Tui Chub	S		D		
Gila boraxobius	Borax Lake Chub	FE	D			
Oncorhynchus clarkii henshawi	Lahontan Cutthroat Trout	FT	D			D
Oncorhynchus mykiss	Redband Trout	S	D	D		D
Rhinichthys osculus	Foskett Speckled Dace	FT		D		
Richardsonius egregius	Lahontan Redside Shiner	S				D
AMPHIBIAN						
Anaxyrus woodhousii woodhousii	Woodhouse's Toad	S				D
Rana luteiventris	Columbia Spotted Frog	S	D	D	D	D

Table 3-15
Special Status Species Documented or Suspected to Exist in on BLM-Administered Lands within the Planning Area

Scientific Name	Common Name	Status	Occurrence Status by BLM District			
			Burns	Lakeview	Prineville	Vale
Rana pretiosa,	Oregon Spotted Frog	S		S	D	
MAMMALS						
Antrozous pallidus	Pallid Bat	S	D	D	D	D
Brachylagus idahoensis	Pygmy Rabbit	S	D	D	D	D
Canis lupus	Gray Wolf	FE				D
Corynorhinus townsendii	Townsend's Big-eared Bat	S	D	D	D	D
Euderma maculatum	Spotted Bat	S	D	S	D	D
Myotis thysanodes	Fringed Myotis	S	D	D	D	D
Spermophilus washingtoni	Washington Ground Squirrel	S			D	D
Vulpes macrotis	Kit Fox	S	D	D		D
INVERTEBRATE ANIMAL						
Cryptomastix populi	Hells Canyon Land Snail	S				D
Monadenia fidelis ssp. nov. *(Deschutes)*	Deschutes Sideband	S			D	
Monadenia fidelis ssp. nov. *(Modoc Rim)*	Modoc Rim Sideband	S		D		
Pyrgulopsis fresti	Owyhee Hot Springsnail	S				D
Pyrgulopsis owyheensis	A Springsnail	S				D
Bombus occidentalis	Western Bumble Bee	S		S		
Boloria selene	Silver-bordered Fritillary	S			D	S

documented (D)
suspected (S)
Status codes:
S = Sensitive
FT = Federally Threatened
FE = Federally Endangered

supply, fish passage barriers, impacts on riparian habitat, reduced water quality from sedimentation and increased turbidity. Land management planning has helped to improve habitat for fish and aquatic species in several ways.

Grazing systems have been redesigned to limit livestock utilization and have proven successful at promoting riparian vegetation recovery. Similar improvements to lake and reservoir aquatic habitat have occurred with implementation of the RMPs. The exclusion of livestock from specific reservoirs, lakes, springs and ponds has reduced siltation and turbidity. Increased vegetative cover around the shoreline of these waters has reduced erosion from wave action and filter overland flows.

Fish habitat and streambank stabilization projects have improved and expanded aquatic habitats within the planning area. These projects have reduced streambank erosion, increased vegetative bank cover, and ultimately have increased late season streamflow.

Borax Lake chub

Ongoing monitoring at Borax Lake has shown that the population is health. Population abundance estimates obtained from 1986 to 1996 indicated a fluctuating population ranging from approximately 4,100 and 37,000 fish. Recent estimates have ranged between approximately 8,200 and 25,500 chub. Recommendations outlined in the Borax Lake Chub Recovery Plan have been met short of providing protections to the water quality and quality from geothermal development throughout the Alvord Desert subbasin.

Alvord chub

Historic data indicate that the species was once abundant and well distributed throughout the Alvord subbasin. Site visits in 2012 show that these historical sites were dry and unavailable to the fish and only 10 percent (2 sites) still had extant populations. The BLM's records show 32 miles of stream channel within Trout, Denio, Van Horn, Oliver, and Alvord Creeks; Juniper, Alvord, and Tumtum Lakes, and Pueblo Slough where Alvord chub has been sampled since 1934. Today, of those 32 miles, approximately 22 miles (69 percent) of habitat are located on privately owned land, and another 6 miles (19 percent) of formerly perennial stream is now dry throughout most years.

Lahontan cutthroat trout

Lahontan cutthroat trout in the Burns District are considered out of basin due to their transplant here. Monitoring in the nine streams where Lahontan cutthroat trout are known have shown that as recently as 2004, all streams contained Lahontan cutthroat trout. The actual population estimate of Lahontan cutthroat trout is unknown, but fluctuations in numbers observed between the 1970s and 2012 confirm that populations are viable and reproducing. Van Horn Creek on Pueblo Mountain is suspected to have lost all or most of its genetic strength with the illegal introduction of German brown trout. While Lahontan

cutthroat trout or hybrids are likely still present in the stream, the Van Horn Lahontan cutthroat trout population is considered lost.

Bull Trout

The factors that have contributed to the decline of bull trout population within each distinct population segment include the restriction of migratory routes by dams and other unnatural barriers; forest management, improper grazing, and agricultural practices; road construction; mining; and introduction of non-native species resulting in adverse habitat modification, excessive timber harvest, and poaching (Rieman and McIntyre 1993). Generally, where status is known and population data exist, bull trout populations in the Columbia River distinct population segment are declining. Bull trout in the Columbia River basin occupy about 45 percent of their estimated historic range (Quigley and Arbelbide 1997). Quigley and Arbelbide (1997) considered bull trout populations strong in only 13 percent of the occupied range in the interior Columbia River basin. Rieman et al. (1997) estimated that populations were strong in 6 to 24 percent of the subwatersheds in the entire Columbia River basin.

Historically, bull trout were thought to utilize the entire Malheur River downstream to the Snake River. Summer and spawning habitat is assumed to have included most of the upper basin tributaries in the upper mainstem and North Fork basins.

Distribution in the North Fork Malheur River has remained unchanged since bull trout were first documented in the basin in. Currently in the North Fork Malheur bull trout are present in and upstream of Beulah Reservoir including most upper basin tributaries. Spawning, juvenile rearing, and adult resident bull trout exist in Horseshoe, Swamp, Sheep, Elk, Little Crane, and Flat Creeks. Migratory bull trout overwinter in Beulah Reservoir and river reaches upstream of the reservoir, and move to the upper basin to spawn.

Bull trout in the Upper Malheur population are distributed upstream of the confluence with Wolf Creek, including many of the upper basin tributaries. Bull trout are not documented in Warm Springs Reservoir, however it may provide suitable overwinter habitat.

Bull Trout only occupy 2.5 miles of BLM-administered habitat in the planning area which includes the North Fork Malheur River and Upper Malheur River. These miles are heavily intermixed between public and private lands making management and restoration efforts difficult to undertake and subsequently measure.

Migratory Birds

The Breeding Bird Survey (Robbins et al. 1986) is the primary source of population trend information for North American landbirds. However, it only has data for the last 30 years, and extensive habitat changes occurred prior to that time which undoubtedly affected bird populations, but for which there are

no quantitative data. Attempts to assess the extent of bird population changes prior to the Breeding Bird Survey have been documented through an examination of historical habitats prior to EuroAmerican contact (approximately 1850) and knowledge of bird species-habitat relationships (Wisdom et al. in press).

Columbia Plateau is the only Breeding Bird Survey Physiographic Region within – the planning area. Of the 16 species with significantly declining trends in the Columbia Plateau, 6 could be considered exclusively or primarily associated with shrub-steppe, 4 with open or agricultural lands, 5 with riparian/wetland habitat, and 1 with forest habitat (**Table 3-16**, Native Landbird Species with Significantly Declining Population Trends in the Columbia Plateau Breeding Bird Survey Physiographic Region). Additionally, some species that lack sufficient Breeding Bird Survey data are considered by many to be declining in the Columbia Plateau (e.g., sage-grouse, sharp-tailed grouse, Lewis' woodpecker) based on anecdotal knowledge of bird species-habitat relationships, and the extent of those habitats historically across the planning area (Wisdom et al. in press). This includes some local and regional extirpations of breeding populations such as sage-grouse in much of eastern Washington, and sharp-tailed grouse throughout Oregon. One species, yellow-billed cuckoo, may have been completely extirpated as a breeding species from the region.

Table 3-16
Native Landbird Species with Significantly Declining Population Trends in the Columbia Plateau Breeding Bird Survey Physiographic Region

Shrub-Steppe	**Riparian/Wetland**
Horned lark (L,R)	Wilson's phalarope (R)
Western meadowlark (L,R)	Spotted sandpiper (L)
Grasshopper sparrow (L)	American coot (R)
Brewer's sparrow (L,R)	Sandhill crane (R)
Black-throated sparrow (L)	Northern pintail (L,R)
Loggerhead shrike (L)	
Agricultural/Open	**Forest/Juniper**
Killdeer (L,R)	Chipping sparrow (L,R)
Mourning dove (L,R)	
American kestrel (R)	
Brewer's blackbird (L, R)	

Source: Sauer et al. 1999
L= long-term trend (1966-1998); R= recent trend (1980 – 1998)

Other Special Status Species

In general, special status wildlife species populations are declining across Oregon. Degradation of habitat as a result of human activities and natural resource development are the primary drivers that contribute to the downward

trend of sensitive wildlife species in Oregon. Other factors that contribute to the decline of special status wildlife species in Oregon include habitat fragmentation, loss of migratory corridors, reduced gene flow, hybridization, disease, drought, and increased predation/competition with nonnative species.

As mentioned above, droughts pose a substantial threat to special status species and have had notable impacts on fish, wildlife, and plant species in the planning area. Climate change data from the past 100 years indicate that annual temperatures have been increasing and will continue to increase in the future. See **Section 3.19**, Climate Change, for additional details on climate change in the planning area. Drought and other extreme weather effects are also expected to increase in frequency and will likely contribute to impacts on special status plant and animal species and their habitat as climate change continues.

3.5 WILD HORSE AND BURROS

The BLM protects, manages, and controls wild horses in accordance with the Wild Free-Roaming Horses and Burros Act of 1971 (PL 92-195, as amended by Congress in 1976, 1978, 1996, and 2004). The FLPMA directs the BLM to manage wild horses and burros as one of numerous multiple uses that also include mining, recreation, domestic grazing, and fish and wildlife. Wild horse and burro management is governed by 43 CFR Subpart 4700. One of the BLM's top priorities is to ensure the health of the public lands so that the species depending on them, including the nation's wild horses and burros, can thrive. BLM policy and regulations also direct that wild horses and burros are to be managed as self-sustaining populations of healthy animals.

Following passage of the Wild Free-Roaming Horses and Burros Act, herd areas were identified in the planning area. Herd areas (HAs) are locations where wild horse and burro populations were found when the Act was passed. Herd Management Areas (HMAs), displayed in **Figure 3-6**, Herd Management Areas in the Planning Area are areas within the HAs where it was decided through LUPs that populations of wild horses and burros would be managed.

3.5.1 Existing Conditions

Conditions on BLM-Administered Lands

There are 24 HAs within the planning area, 22 of which contain either PGH or PPH.

Table 3-17, Acres of Wild Horse and Burro Herd Management Areas within Sage-Grouse Habitat in the Planning Area, displays the acres of PPH and PGH in herd areas.

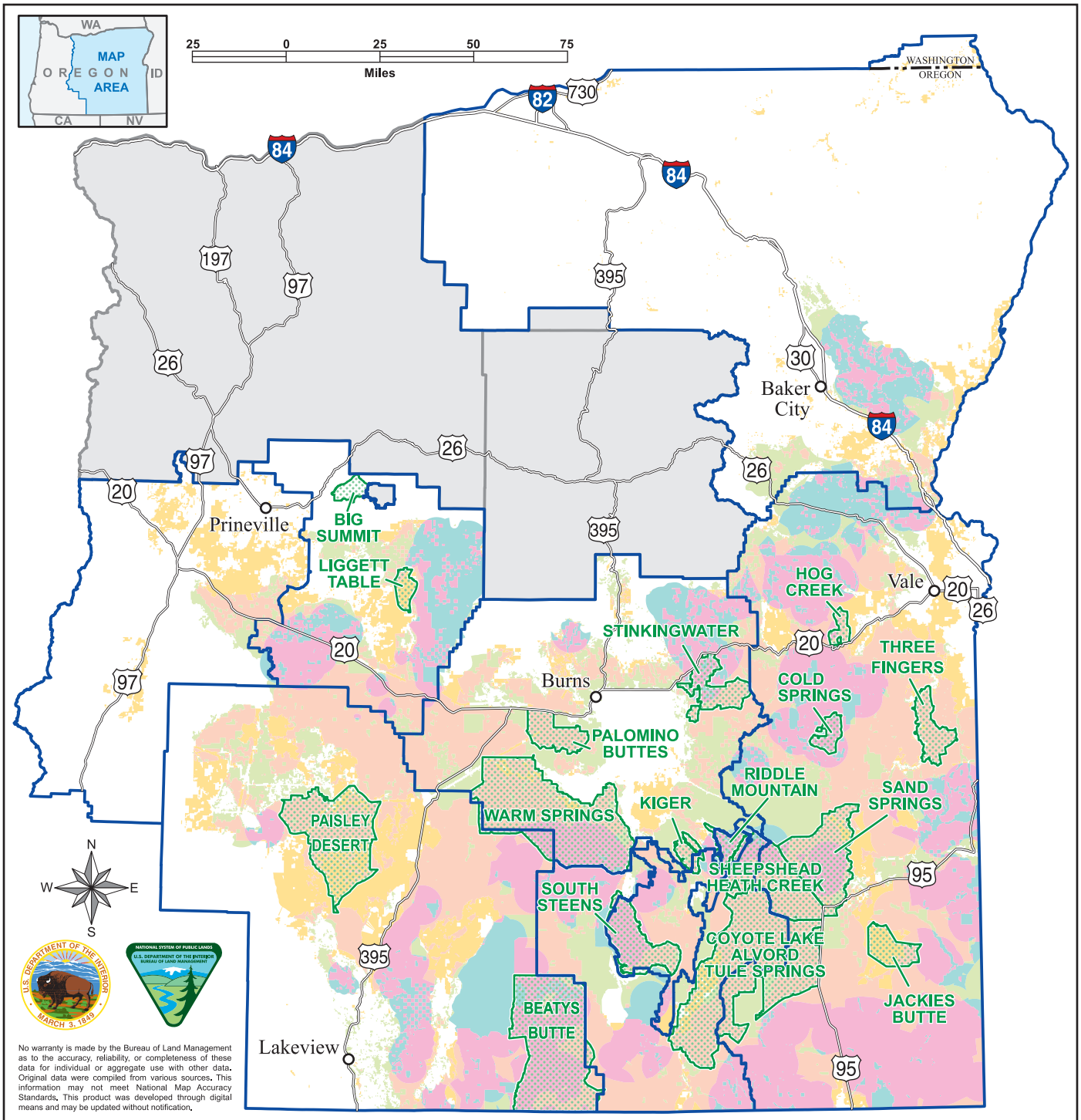


Figure 3-6: Herd Management Areas in the Planning Area

M11-11-04

Table 3-17
Acres of Wild Horse and Burro Herd Management Areas within Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres within Sage-Grouse Habitat	Acres within PGH	Acres within PPH
BLM	IV	548,100	302,100	246,000
	V	1,815,000	1,260,100	554,900
Forest Service	IV	0	0	0
	V	0	0	0

Source: Manier et al. 2013

Wild horse and burro populations are managed within Appropriate Management Levels (AML) and corresponding forage (allocations in AUMs). The AML for each HMA is expressed as an acceptable range with a single number being the high end of that range. Forage allocations for horses in the HMA are based on that maximum number of the AML range. AMLs, as well as the boundaries of each HMA, were established through previous LUPs. AMLs are based on best available science and rangeland monitoring studies and are established to ensure that public land resources, including wild horse habitat, are maintained in satisfactory, healthy condition, and that unacceptable impacts on these resources are minimized. To date, the data gathered during HMA monitoring supports established AMLs.

The BLM manages 17 HMAs in the planning area. Out of the 17 HMAs, 15 contain some type of sage-grouse habitat within the planning area.

Current AML, forage allocations, and HMA acreages by habitat type are shown in **Table 3-18**, Oregon Subregion – HMAs. Healthy populations of wild horses and burros are maintained through periodic gathers, removals, and other approved methods of population growth suppression. The initiation of gathering or other population growth suppression is based on inventory data, herd health, rangeland health, climatic conditions, and occurrence of catastrophic events such as wild fire and drought. Horses are also gathered if they stray outside the boundaries of the HMA. Generally, gathering is scheduled every three to five years, depending on reproductive rates, death rates, funding, public concern, and other special management considerations.

Population control measures have been and may continue to be conducted in all of the HMAs. These measures include, but are not limited to, fertility control using immunocontraceptives, adjusting sex ratios, releasing a gelding component into an HMA, and non-reproducing HMAs. All of these measures are an attempt to balance the reproduction rate of wild horse herds with public adoption demand to control holding costs of excess horses.

Table 3-18
Oregon Subregion – HMAs

HMA	District	GRSG MZ	Acres				AML	AUMs
			Non Habitat	PGH	PPH	Total		
Beatys Butte	Burns/ Lakeview	V	249	101,383	298,228	399,860	100-250	3,000
Cold Springs	Vale	IV	0	0	29,904	29,904	75-150	1,800
Coyote Lake-Alvord-Tule Springs	Burns/ Vale	V	51,884	501,553	489	553,926	198-390	4,680
Hog Creek	Vale	IV	3,126	15,014	3,692	21,832	30-50	600
Jackies Butte	Vale	IV	48,084	15,939	1,254	65,277	75-150	1,800
Kiger	Burns	IV, V	411	24,534	1,939	26,884	51-82	984
Ligget Table	Prineville	V	23,638	4,443	0	28,081	10-25	300
Paisley Desert	Lakeview	V	114,600	182,826	41	297,467	60-150	1,800
Palomino Buttes	Burns	V	1,314	70,355	0	71,669	32-64	768
Pokegama	Lakeview	NA	12,193	0	0	12,193	30-50	600
Riddle Mountain	Burns	IV	1,113	1,326	25,956	28,395	33-56	672
Sand Springs	Vale	IV	14,263	87,174	91,405	192,842	100-200	2,400
Sheepshead-Heath Creek	Burns/ Vale	IV, V	891	139,443	58,674	199,008	161-302	3,624
South Steens	Burns	V	1,341	43,090	82,324	126,755	159-304	3,648
Stinkingwater	Burns	IV	2	41,226	37,086	78,314	40-80	960
Three Fingers	Vale	IV	3,356	59,415	0	62,771	75-150	1,800
Warm Springs	Burns/ Lakeview	V	30,397	264,903	141,902	437,202	111-202	2,424
Total			***306,862***	***155,2624***	***772,894***	***2,632,380***	***1,340-2,605***	

Source: Oregon/Washington BLM 2013

3.5.2 Trends

Wild horse and burro population and habitat monitoring are evaluated every 3 to 5 years, when environmental analysis of specific population control activities is conducted. Past evaluations indicate that when wild horse and burro populations remain within current AML range, HMAs are generally capable of meeting all applicable rangeland health standards; however, as populations exceed high AML, wild horses and burros can be causal factors for failing to meet applicable standards.

It should be noted that wild horse and burro grazing can have different physical and spatial ecological impacts compared with domestic cattle grazing due to different timing and space of use. As a result, AMLs are set at levels of use that would meet BLM rangeland health standards, not a direct balancing of forage allocation with domestic livestock and wildlife.

As of May 2013, population estimates indicate wild horse and burro populations are within AML on 12 of the 17 HMAs within the planning area. Cold Springs, South Steens, Ligget Table, Palomino Butte, and Beatys Butte HMAs are above high AML levels, and the total population estimate for the planning area is 3,006, approximately 15 percent above the high AML level. It should be noted that wild horse and burro populations are dynamic and these figures represent best estimates for a static point in time only.

It is also recognized that inventory methods can influence population estimates. Historically, inventories utilized direct count methods which may undercount populations by as much as 32 percent (Lubow and Ransom 2009). The BLM has been working with the USGS's Fort Collins Science Center to develop methods that will achieve greater accuracy in population estimates which correct for sightability and detection. Population estimates for wild horse and burro populations now routinely apply an undercount bias correction factor based on topography, vegetative cover, and weather and flight conditions.

Populations may be impacted by limitation on gathers; the time period between gathers is influenced by limitations in short- and long-term holding facilities, adoptions, and other HMAs outside of Oregon where emergency situations may mandate adjustments in gather schedules. Rangeland health standards may not be met if periodic gathers are not conducted to maintain AML.

Finally, factors other than wild horse and burro populations may contribute to failure to meet all rangeland health standards within HMAs in some instances. These factors include western juniper encroachment, invasive plants and noxious weed infestations, and impacts from livestock and wildlife grazing.

3.6 WILDLAND FIRE MANAGEMENT

The wildland fire management program consists of hazardous fuels management and wildfire management. The hazardous fuels program has two main emphasis areas: 1) reduction of risk to human life and property, including key

infrastructure such as power lines and communication towers; and 2) ecosystem restoration. Wildfire management can be further broken into prevention, education and mitigation; preparedness; detection; and response. Wildfire response, in turn, is governed by threats to human life and safety and threats to social, cultural, and natural resource values identified in the resource management plan.

The Federal Wildland Fire Management Policy (FWFMP) was developed by the secretaries of the Departments of Interior and Agriculture in 1995 in response to dramatic increases in the frequency, size, and catastrophic nature of wildland fires in the US. The 2001 review and update of the 1995 FWFMP (DOI et al. 2001) consists of findings, guiding principles, policy statements, and implementation actions, replaces the 1995 FWFMP, and is the primary interagency wildland fire policy document. This document directs federal agencies to achieve a balance between fire suppression to protect life, property, and resources, and fire use to regulate fuels and maintain healthy ecosystems. Multiple updates have been provided in memorandum and current implementation direction has been provided in the February 2009 *Guidance for Implementation of Federal Wildland Fire Management Policy* (USDA and DOI 2009). The BLM's policies follow this plan and implementation guidelines.

Wildland fire has been identified as a primary factor associated with GRSG population declines. Fire can result in the loss of habitat and loss of a food source.

Additional direction for fire management in GRSG habitat is provided in BLM Instruction Memorandum 2011-138, Sage-Grouse Conservation Related to Wildland Fire and Fuels Management (BLM 2011a).

3.6.1 Existing Conditions

Conditions of the Planning Area

Currently, there are more than 15 million acres of sagebrush habitat in Oregon, much of it in the Great Basin ecosystem. USFWS identified long-term loss of sagebrush and conversion to exotic annual grassland as the primary threats arising from wildfire. From 1980 to 2011, approximately 3.9 million acres burned in the planning area, including the Burns, Lakeview, Prineville, and Vale BLM Districts and Hart Mountain and Malheur National Wildlife Refuges (http://fam.nwcg.gov/fam-web/weatherfirecd/). This total includes a mix of ecosystems, including sagebrush-steppe, juniper woodland, coniferous forest, salt desert shrub, and annual grasslands and some lands outside the actual planning area. Lightning started 75 percent of these fires with the remainder started by humans. Approximately 87.5 percent of these fires burned less than 100 acres, which means the fires that pose the biggest threat to sage-grouse habitat encompass only 12.5 percent of all fires. Of these larger fires, only 2 percent exceeded 5,000 acres. In Wyoming big sagebrush sites, full recovery to

pre-burn sagebrush canopy cover conditions will take over 100 years (Cooper 2007); however, some higher elevation habitats, where mountain big-sagebrush is the canopy dominant, rapid regeneration due to site potential, seed production, and layering can produce 25 percent cover within 20 years (Winward 2004) In addition, the area dominated by annual grasses continues to increase, partly as a result of wildfire (see Invasive Plant subsection for more details).

WAFWA Management Zones IV and V

Table 3-19, Acres of Wildfire within Sage-Grouse Habitat in the Planning Area, and **Table 3-20**, Acres with High Probability for Wildfire within Sage-Grouse Habitat in the Planning Area, display data compiled in a Baseline Environmental Report (BER) produced by the USGS and BLM (Manier et al. 2013). In each table, acres are presented by surface management agency and their occurrence within PGH and PPH in the planning area.

Table 3-19
Acres of Wildfire within Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres[1]	Acres within PGH	Acres within PPH
BLM	IV	294,300	114,700	179,600
	V	246,600	150,000	96,600
Forest Service	IV	0	0	0
	V	14,700	12,700	2,000
Tribal and Other Federal	IV	1,000	1,000	0
	V	5,200	100	5,100
Private	IV	64,800	29,200	35,600
	V	61,800	24,700	37,100
State	IV	12,400	2,600	9,800
	V	2,800	2,700	100
Other	IV	0	0	0
	V	0	0	0

Source: Manier et al. 2013
[1]Acres calculated from wildfires occurring between 2000 and 2012

Table 3-20
Acres with High Probability for Wildfire within Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres with High Probability for Wildfire[1]	Acres within PGH	Acres within PPH
BLM	IV	3,668,800	1,827,400	1,841,400
	V	4,234,600	2,478,500	1,756,100
Forest Service	IV	11,600	200	11,400
	V	58,600	39,000	19,600

Table 3-20
Acres with High Probability for Wildfire within Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres with High Probability for Wildfire[1]	Acres within PGH	Acres within PPH
Tribal and Other Federal	IV	53,500	29,600	23,900
	V	133,800	49,600	84,200
Private	IV	1,119,900	532,100	587,800
	V	1,110,300	632,500	477,800
State	IV	369,700	272,100	97,600
	V	109,900	71,400	38,500
Other	IV	0	0	0
	V	500	500	0

Source: Manier et al. 2013
[1]Derived from Forest Service FSim Burn data
Source data was reclassified to create three categories of data: non-burnable = 0, low probability = 0.00002 to 0.0043, and high probability = 0.0043 to 0.0732.

Table 3-20 displays the total acres and acres of GRSG habitat in the planning area that were affected by wildland fire over the past 12 years.

Table 3-20 displays acres with high probability for wildfire based on the Forest Service's FSim data, a large fire simulator that develops fire probability data based on historical weather data and current land cover data. Large fire burn probability is based on a national burn probability for the US that was generated for the 2012 Fire Program Analysis System.

Conditions on BLM-Administered Lands

During the 2012 fire season nearly 1 million acres burned, the majority of which was in designated PPH. The most substantial fires included Long Draw on the Vale District (the largest fire in Oregon in 100 years) at 557,648 acres, Miller Homestead on the Burns District with 160,000 acres, and Holloway which burned from Winnemucca District in Nevada onto Burns and Vale Districts with an estimated 224,786 acres burned in Oregon (BLM 2012f). Burning conditions in 2012 were unusually severe. Fuel loadings and available fuels were unusually high, the result of three good years of grass production followed by a very dry winter with little snow to compact the previous years' production and a multi-million acre outbreak of aroga moth, a sagebrush defoliator, that apparently resulted in very low live fuel moistures in sagebrush. In addition, weather conditions during summer were unusually severe with several consecutive days of high temperatures over 100°F, daytime relative humidity in the single digits, nighttime humidity recovery only into the low teens, and high winds. These weather conditions allowed for active burning at all hours of the day and night.

The three factors that govern whether a fire will become large and further degrade existing sage-grouse habitat conditions are fuel amount and continuity, weather, and topography. Of these, the BLM can only affect fuel amount and continuity. Fire regime condition class (FRCC) is intended to provide a general assessment of the threat wildfire may pose to ecological function and integrity based on the degree of departure from reference conditions. In the case of FRCC, reference conditions are defined as the mix of successional, or structure, classes that theoretically existed prior to 1850 (NIFTT 2010). The hazardous fuels program is designed to reduce those risks.

Wildfire response is intended to support the established RMP direction, although the BLM Washington Office and DOI, Office of Wildland Fire often provide additional direction. Such additional direction was provided through 2011-138 detailing wildfire response in sage-grouse habitat (BLM 2011a). . All wildfire response must be consistent with the FWFMP and implementation guidance (USDA and DOI 2009).

Fire Regime Condition Class

There are two departure facets to FRCC: the vegetation and the fire return interval (average period between fires). The LANDFIRE project includes both a fire regime data layer and a vegetation departure data layer, which were used to estimate the degree of ecological departure for each district. Extreme departure from the historical conditions results in changes to one or more of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g., insect and disease mortality, grazing, and drought).

Condition class indicates the degree of departure from the historic fire regime (Hann and Bunnell 2001; **Table 3-21**, Fire Regime Condition Classes). While the fire regime of a particular area is not likely to change except in the very long term, the condition class can be changed through fire management and other vegetation management actions.

Table 3-21
Fire Regime Condition Classes

Fire Regime Condition Classes	Attributes
Condition Class 1	Fire regimes are within or near an historical range. The risk of losing key ecosystem components is low. Fire frequencies have departed from historical frequencies by no more than one return interval. Vegetation attributes (species composition and structure) are intact and functioning within a historical range.

Table 3-21
Fire Regime Condition Classes

Fire Regime Condition Classes	Attributes
Condition Class 2	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components has increased to moderate. Fire frequencies have departed (either increased or decreased) from historical frequencies by more than one return interval. This results in moderate changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. Vegetation attributes have been moderately altered from their historical range.
Condition Class 3	Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, frequency, intensity, severity, or landscape patterns. Vegetation attributes have been significantly altered from their historical range.

Source: Hann et al. 2008

Fire regime (pattern, frequency and intensity of the wildfires that prevail in an area) has been divided into five categories based on typical fire severity with respect to vegetation and average fire return interval (**Table 3-22**, Fire Regime Groups and Descriptions). Vegetative condition class quantifies the amount that current vegetation has departed from the simulated historical vegetation reference conditions. Three condition classes describe low departure (Class 1), moderate departure (Class 2), and high departure (Class 3). Vegetative condition class is calculated based on changes to species composition, structural stage, and canopy closure using methods described in the Interagency Fire Regime Condition Class Guidebook (Hann et al. 2008). LANDFIRE vegetative condition class is based on departure of current vegetation conditions from reference vegetation conditions only, whereas the guidebook approach includes departure of current fire regimes from those of the reference period.

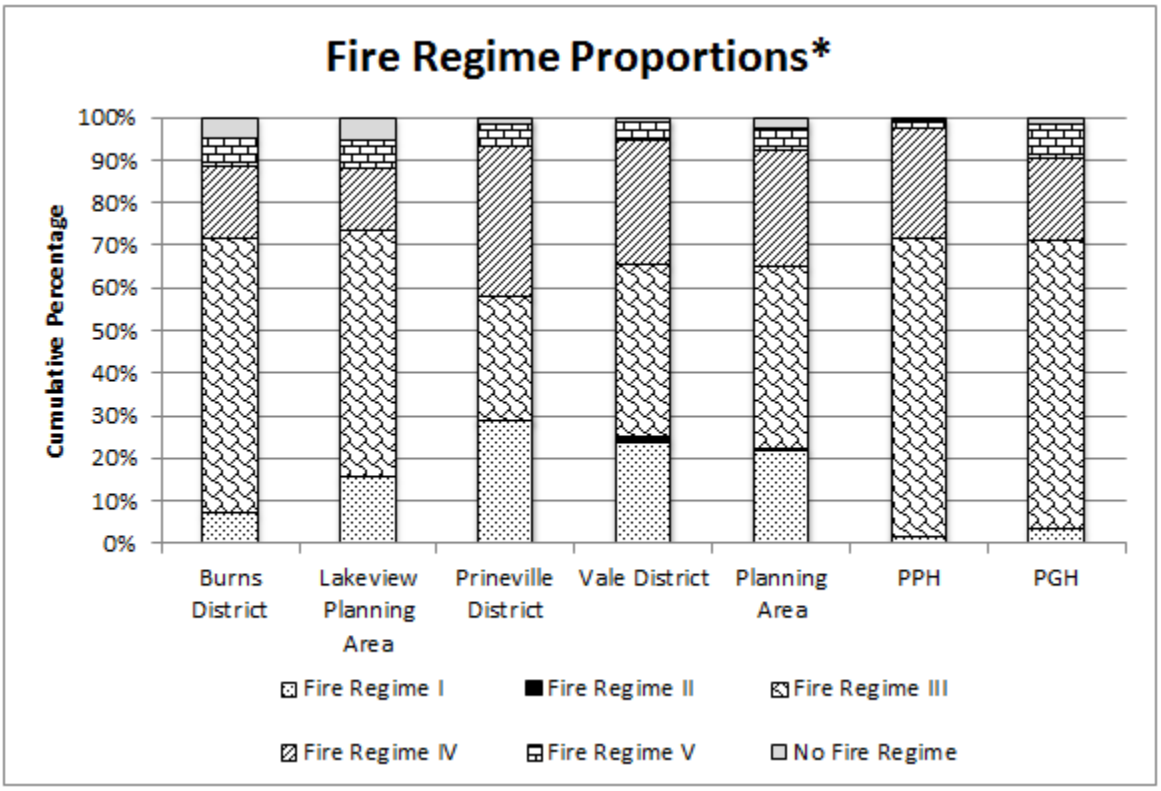
Fire regime III is the most common fire regime in the planning area based on LANDFIRE data (**Figure 3-7**, Proportion of Planning Area in each Fire Regime). Common vegetation types in this regime include mountain big sagebrush, low sagebrush-fescue, mixed (mountain) shrub, western juniper savanna. Fire regimes IV and I are also common, while fire regime II is the least common. Fire regime IV is characterized by Wyoming big sagebrush, low sagebrush-bluebunch wheatgrass, aspen, western juniper woodland, mountain-mahogany, lodgepole pine (Upper Deschutes planning area only), while Fire Regime II is characterized

Table 3-22
Fire Regime Groups and Descriptions

Group	Frequency	Severity	Severity Description
I	0-35 years	Low/mixed	Generally low-severity fires replacing less than 75% of the dominant over story vegetation; can include mixed-severity fires that replace up to 75% of the over story
II	0-35 years	Replacement	High-severity fires replacing greater than 75% of the dominant over story vegetation
III	35-200 years	Mixed/low	Generally mixed-severity; can also include low-severity fires
IV	35-200 years	Replacement	High severity fires
V	200+ years	Replacement/any severity	Generally high-severity; can also include any severity type in this frequency range

Source: Hann et al. 2008

Figure 3-7 Proportion of Planning Area in each Fire Regime



Source: LANDFIRE v. 1.1.0
*These values include in-holdings of other lands within a BLM-managed lands matrix, such as National Forests System lands, National Wildlife Refuges, National Parks and Monuments, Indian reservations, state and county lands, and private lands.

by native perennial grasslands. Common vegetation types in Fire Regime I include Ponderosa pine forest, dry mixed conifer forest and native perennial grasslands. Between one and six percent of the planning area has no fire regime as the land was classified as barren, snow and ice, water, too sparsely vegetated to classify or of indeterminate fire regime characteristics.

Most of the planning area is classified as moderately departed from historical conditions with respect to vegetation, estimated 65 percent departure. The proportion of land classified as highly departed from historical conditions is 15 percent overall. The degree of departure for sage-grouse habitat is very similar to the planning area-wide degree of departure.

Acres Treated in the Hazardous Fuels Reduction Program

Wildfire mitigation includes hazardous fuels reduction using mechanical treatment (i.e., brush beating, mowing, or cutting juniper) and prescribed burning. Herbicide use has been limited. Some treatment regimens also include seeding where native vegetation has been reduced below a desired threshold through successional processes. Reporting of hazardous fuels reduction treatments in a dedicated database has only occurred since 2003. Individual treatments that form a treatment regimen are reported separately. Thus, the reported acres are by treatment type for each activity on a given acre and not the actual geographic area treated on the landscape. For example, a given acre may have been thinned, machine piled, and the piles burned, but each treatment method is reported separately, resulting in double or triple-counting the same area. These various treatments on any given acre are all meant to cumulatively move the vegetation toward the desired future condition. The existing databases do not allow determination of the actual acres. Treatments conducted within the planning area over the past five years are outlined in **Table 3-23**, Average Acres Treated Annually (2005-2012). **Table 3-23** also outlines the average acres treated in PPH and PGH areas. Most of the treatments were conducted to reduce threats to wildland-urban interface areas or in juniper woodland attempting to restore sagebrush-steppe.

Within the planning area a variety of fuels treatments have been utilized to address the specific vegetative conditions found on the ground. In southeastern Oregon, a major concern is controlling the spread of nonnative invasive grasses. In Central Oregon, the focus has been more on restoration treatments involving juniper encroachment, as well as, treatment of fuels in the wildland-urban interface to protect communities.

Wildfire Response

The planning area can experience human-caused fires at any month of the year. However, the largest fires and severest fire seasons are associated with lightning fire occurrence and far more fires are started by lightning than people throughout the analysis area. Wildfire occurrence peaks in July and August.

Table 3-23
Average Acres Treated Annually (2005-2012)

Treatment Category	Total Acres Treated	Acres Treated in PPH	Acres Treated in PGH
Burn	146,495	65,109	81,386
Chemical	692,316	324,704	367,612
Harvest	893	191	702
Mechanical	162,389	75,602	86,787
Revegetation	139,2776	63,750	75,527

Sources: BLM GIS 2013
Burn includes: Broadcast Burn; Fire Use; Hand Pile Burn; Jackpot Burn; Machine Pile Burn; Underburn; and Unknown
Chemical includes: Herbicide; Monitor
Harvest includes: Commercial-Timber; Woodcutting - Domestic use
Mechanical includes: Clearing; Cutting; Designated No Treatment; Lop and Scatter; Mastication/Mowing; Piling ; Pruning; Scarification; Shrub/Weeds Removal
Revegetation includes: Range Seeding; Shrub Planting; Tree Planting; Tree Seeding-Artificial

Most fires are suppressed at a small size; approximately 88 percent burn less than 100 acres, and less than 2 percent burn over 5,000 acres. Within the planning area, central Oregon typically experiences the greatest number of fire starts while southeastern Oregon typically experiences the greatest number of acres burned.

On BLM-administered lands, wildfires burned approximately 15 percent of the designated PGH and 14 percent of the designated PPH across the planning area from 1980 through 2011. Approximately 85 percent of the acres burned have been in southeastern Oregon. The balance of the acres burned in both types of habitat has been in central Oregon, which also has the least amount of designated PPH or PGH.

3.6.2 Trends

Within the planning area, over the past century the combination of wildfire suppression and changing land use patterns has altered the natural cycle and role of fire. In moister, higher elevation sites fire suppression is altering what were historically sagebrush shrub lands by allowing encroachment of juniper and other conifers into the sagebrush. In some cases sagebrush within this habitat is also transitioning to older age class that is more decadent, with high fuel loading that can support large severe wildfires. In each case, these increased fuel loadings are leading to fires of higher severity (Miller et al. 2001). In other areas, such as where disturbance has resulted in replacement or invasion by cheatgrass, the fire return interval has decreased and vegetative structure and composition is changing significantly as a result (Brooks et al. 2004; Blomberg et. al. 2012). Fires in these areas spread rapidly and quickly become large because the fuels are continuous, fine, and flashy. In all cases, these changes from historic fire regimes typically result larger fires by increasing the resistance to control while decreasing the effectiveness of firefighting effort (USFWS 2013a).

3.7 LIVESTOCK GRAZING / RANGE MANAGEMENT

The foremost authority that provides for public land grazing is the Taylor Grazing Act which was passed on June 28, 1934, to protect public rangelands and their resources from degradation, to provide an orderly use to improve and develop public rangelands, and to stabilize the livestock industry. Following various homestead acts, the Taylor Grazing Act established a system for allotting grazing privileges. The FLPMA and Public Rangeland Improvement Act also provide authority for managing grazing on public rangelands. Grazing administration exclusive of Alaska is governed by 43 CFR Subpart 4100.

The grazing administration regulations were revised in 1995 to include Fundamentals of Rangeland Health and Standards and Guidelines for Grazing Administration (43 CFR Subpart 4180). In accordance with 43 CFR Subpart 4180.2, *Standards for Rangeland Health and Guidelines for Livestock Grazing Management for Public Lands Administered by the Bureau of Land Management in the States of Oregon and Washington* was placed in effect on August 12, 1997. (**Appendix M,** Standards for Rangeland Health and Guidelines for Livestock Grazing Management) Standards are integrated into the BLM's land management through incorporation into LUPs, as a basis for environmental assessments and through National Environmental Policy Act (NEPA) analysis, and as a basis for monitoring. Guidelines are integrated into land management by applying them to livestock grazing authorizations. The standards and guidelines provide a clear statement of agency policy and direction for those who use BLM-administered lands for livestock grazing and for those who are responsible for their management and accountable for their conditions. Rangeland health evaluations are part of the permit renewal process. If standards are not being met, then management changes would be implemented to make progress toward attainment per current BLM grazing regulations. A grazing permit is the document which authorizes livestock grazing use of the BLM-administered lands within an established grazing district, whereas a grazing lease is the document which authorizes livestock grazing use of BLM-administered lands outside an established grazing district (43 CFR Subpart 4100.0-5). The kind and number of livestock, the period of use (seasonal), the allotment to be used, and the amount of use in AUMs are mandatory terms and conditions of every grazing permit or lease (43 CFR Subpart 4130.3). An AUM is the amount of forage necessary for the sustenance of one cow or its equivalent for one month. An allotment is an area of land designated and managed for grazing of livestock (43 CFR Subpart 4100.0-5).

3.7.1 Existing Conditions

The BLM manages livestock grazing on 749 allotments on 6,218,500 acres of BLM-administered land in the planning area containing either PGH or PPH. These allotments include 927,660 authorized AUMs; **Table 3-24**, Summary of Allotments and AUMs in Sage-Grouse Habitat by District, provides an overview of the authorized grazing in the planning area, and **Table 3-25**, Acres of Grazing Allotments within Sage-Grouse Habitat in the Planning Area, characterizes acres of grazing allotments in GRSG habitat based.

Table 3-24
Summary of Allotments and AUMs in Sage-Grouse Habitat by District

District Office	Number of Allotments	Authorized AUMs
Burns	232	244,370
Lakeview	100	161,553
Prineville	82	89,998
Vale	335	431,739
TOTAL	**749**	**927,660**

Source: Oregon/Washington BLM 2013

Table 3-25
Acres of Grazing Allotments within Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres	Acres within PGH	Acres within PPH
BLM	IV	3,924,300	1,843,900	2,080,400
	V	5,824,200	3,576,900	2,247,300
Forest Service	IV	32,100	7,800	24,300
	V	137,200	101,800	35,400
Tribal and Other Federal	IV	27,100	24,800	2,300
	V	3,800	2,700	1,100
Private	IV	718,500	317,500	401,000
	V	1,179,400	728,800	450,600
State	IV	61,500	40,100	21,400
	V	38,700	20,600	18,100
Other	IV	0	0	0
	V	3,700	3,700	0

Source: Manier et al. 2013

An assessment of rangeland health standards and guidelines completed between 1998 and 2011 evaluated 428 allotments that contain PPH or PGH. This information is summarized by district in **Table 3-26**, Land Health Standard Assessments for Allotments within Sage-Grouse Habitat by District and presented in full in **Appendix N**, Rangeland Health Standards by Grazing Allotment. Of the allotments assessed, 339 allotments (77 percent) are meeting all applicable standards and guidelines. An additional 48 allotments (11 percent) are not achieving all standards and guidelines due to livestock grazing; however appropriate management actions have been implemented to move toward achieving standards and guidelines in the future. On 41 allotments (9 percent), livestock grazing was not a causal factor for failing to achieve all standards and guidelines. Factors that may influence ability to achieve standards and guidelines include but are not limited to invasive species, encroachment of juniper into

Table 3-26
Land Health Standard Assessments for Allotments within Sage-Grouse Habitat by District

District	All Standards Met (Allotments)	Standards Not Met Due to Livestock Grazing (Allotments)	Standards Not Met due to other factors (Allotments)	No land –heath assessment completed (Allotments)
Burns	168	24	20	20
Lakeview	88	1	11	0
Prineville	18	15	6	43
Vale	65	8	4	258
TOTAL (Allotments; % of assessed allotments)	339 (77%)	48 (11%)	41 (9%)	321

Source: Oregon/Washington BLM 2013.
Note table represent assessments completed in allotments that contain PPH and or PGH.

sagebrush and other habitats, fire, and anthropogenic disturbances such as energy development or off-road vehicle use. Standards and guidelines assessments have not been completed on 321 allotments (43 percent of total allotments). Allotments are scheduled for land health assessments based on permit renewal cycles and allotment management category.

Of the 48 allotments (1,067,900 acres) in the planning area found to be not meeting land health standards with livestock grazing as the causal factor, approximately 350,000 acres contained PGH and 717,900 acres contained PPH (see **Table 3-27**, Allotments Not Meeting Land Health Standards within Sage-Grouse Habitat with Grazing as the Causal Factor).

Table 3-27
Allotments Not Meeting Wildlife Land Health Standards within Sage-Grouse Habitat with Grazing as the Causal Factor

Surface Management Agency	Management Zone	Total Acres of Allotments Not Meeting Land Health Standards[1]	Acres within PGH	Acres within PPH
BLM	IV	939,600	285,100	654,500
	V	128,300	64,900	63,400

Source: Manier et al. 2013
[1]Based on allotments on BLM-administered lands where land health standards have been assessed.

Livestock grazing allotments are administered under three selective management categories designed to concentrate public funds and management efforts on allotments with the most significant resource conflicts and the greatest potential for improvement (BLM Manual Handbook 1740-1).

The categories include:

- Improve (I) category allotments are managed to resolve high-level resource conflicts and concerns and receive highest priority for funding and management actions. These allotments include those where the BLM administers enough land to implement changes.
- Maintain (M) category allotments are managed to maintain currently satisfactory resource conditions and will be actively managed to ensure that resource values do not decline.
- Custodial (C) category allotments are typically small unfenced allotments intermingled with larger tracts of non-BLM lands, limiting BLM management opportunities.

In addition to criteria identified in the handbook, recent guidance (Washington Office IM 2009-018) provides additional criteria to be used to designate allotments as Category I, M, or C. For allotments assessed for rangeland health that contain PPH or PGH, approximately 139 allotments are managed in the "I" category, 135 in the "M" category, and 159 in the "C" category that contain PPH and PGH habitat.

Improvements and routine maintenance for livestock management on BLM-administered lands in the planning area occur at varying densities based upon management needs, land ownership patterns and other factors. These include, but are not limited to fences, cattleguards, corrals, pipelines, water troughs, wells, and reservoirs. Fences are used to delineate allotment boundaries, pastures within allotments, land ownerships, and to exclude the impact of ungulate grazing from certain resources. **Table 3-28**, Miles of Fences within Sage-Grouse Habitat in the Planning Area, characterizes the amount of fences in GRSG habitat.

Table 3-28
Miles of Fences within Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Miles[1]	Miles within PGH	Miles within PPH
BLM	IV	4,400	1,900	2,500
	V	5,200	3,100	2,100
Forest Service	IV	0	0	0
	V	300	200	100
Tribal and Other Federal	IV	100	100	0
	V	100	100	0
Private	IV	1,700	700	1,000
	V	2,200	1,400	800
State	IV	200	100	100
	V	0	0	0

Source: Manier et al. 2013
[1]Derived from a dataset that identifies pasture and allotment borders on BLM-administered and National Forest System land as potential fences

Additional structural improvements include watering facilities constructed by the permittee/lessee used to improve livestock distribution in areas where naturally occurring surface water is not available and to reduce livestock use of naturally occurring springs and streams.

3.7.2 Trends

In general, livestock grazing use within the region has significantly decreased from its peak in the early part of the last century. For the most part, these declines are due to reductions in use to more closely reflect the range's carrying capacity. Present levels of demand for forage resources are anticipated to continue. Other factors that impact livestock grazing management in the planning area include drought, infestations of noxious weeds, and wildfire. Changes in land use on private and BLM-administered lands, such as increased use for recreational purposes, have also influenced livestock grazing. Climate change may impact livestock grazing by changing the relative amount of forage available for livestock or wildlife use in a given area.

Domestic livestock grazing occurs in nearly all sagebrush habitat in the planning area. It does not occur in some wilderness and recreation areas. Understanding the impacts of current grazing practices as well as identifying where habitats may be at risk is crucial to the persistence of sagebrush habitats and the species that rely on them (Aldridge et al. 2008).

One important objective in managing livestock grazing relevant to GRSG is to maintain residual cover of herbaceous vegetation to reduce predation during nesting (Beck and Mitchell 2000). When all rangeland health standards have been met, it is expected that current grazing management is adequate to maintain perennial bunchgrass communities and support GRSG habitat objectives. This is consistent with Cagney et al. (2010) and France et al. (2008) who indicate that moderate levels of livestock use are generally compatible with maintenance of perennial bunchgrass, though sustainable use varies with a number of environmental factors.

3.8 RECREATION

In accordance with the BLM's multiple-use mandate, per the FLPMA, the agency seeks to provide recreational opportunities that include dispersed, organized, competitive, and commercial uses. Recreation decisions made during the land use planning process are outlined in the BLM Land Use Planning Handbook (H-1601-1 – Appendix C; BLM 2005d) and in guidance contained in IM 2011-004 (BLM 2010b).

The BLM manages organized, commercial, and competitive recreation activities on BLM-administered lands and related waters with special recreation permits (SRPs). As a management tool, SRPs reduce user and resource conflicts, mitigate adverse impacts on resources, provide opportunities for monitoring activities, enhance visitor experience opportunities, and, through user fee requirements, allow for a fair return for these types of public land uses. Issuance of an SRP is

discretionary, with proposed activities subject to NEPA compliance and determined mitigation requirements established specific to a proposed activity.

3.8.1 Existing Conditions

Conditions of the Planning Area

The diverse planning area offers multiple settings for a wide range of opportunities for recreation, most occurring on public land requiring no permits and no or minimal fees.

Popular recreational activities include driving for pleasure, hiking, mountain biking, camping, hunting, fishing, OHV riding, horseback riding, rock climbing, skiing, visiting cultural sites, bird watching, viewing wildflowers, backpacking, rockhounding, and motorized and non-motorized boating. Flying radio-controlled aircraft, rock crawling, parasailing, and geocaching are also growing in popularity in parts of the planning area.

Visitor use patterns within many parts of the planning area are seasonal. Due to variations in local climate, some areas receive very little summer use but become popular destinations during winter months.

Water-based recreation is an important component of the Oregon recreation landscape. Boating, sport fishing, and water sports (e.g., waterskiing, wakeboarding, etc.) are popular on Oregon's lakes, reservoirs, rivers, and coastal areas.

Snow-based winter recreation, including downhill and cross-country skiing, is popular in higher elevation areas. Cross-country skiing, backcountry skiing, and snowshoeing opportunities are available on public and private lands.

A "rockhound" is an amateur geologist who enjoys collecting unusual or interesting rock, mineral, and gem specimens. Rockhounding involves collecting not more than 250 pounds per year and is allowed free of charge on BLM-administered lands. Commercial collecting for the purpose of sale or barter is not allowed without special authorization. Also, rock cannot be collected on BLM-administered lands for construction or decorative purposes in landscaping without a permit. Rockhounds may use hand tools, such as shovels and picks, but must not use explosives or power equipment for excavation.

The majority of recreational opportunities on public lands are on lands administered by the BLM, Forest Service, Bureau of Reclamation, and other agencies.

Oregon's 13 national forests (including 1 national scenic area and 1 national grassland) provide a variety of structured and unstructured recreation opportunities similar to BLM-administered lands.

There are 29 units of the National Park System in Oregon, including 1 national park and 2 national monuments. These areas provide a wide variety of automobile touring, developed and dispersed camping, and dispersed quiet recreation opportunities. OHV recreation is generally more restricted in NPS units (also see **Section 3.15**, Special Designations).

Oregon State Parks manages 192 state parks, natural areas, state historic parks, scenic corridors, and other outdoor sites. Most state parks charge an entrance fee for day use, and developed recreation opportunities such as camping also require a fee. Once in a state park, dispersed recreation is generally free of cost.

A limited amount of state trust lands are available for a variety of recreational activities.

Non-government recreation providers also play an important role in producing recreation and tourism opportunities on public lands. Many local and regional businesses provide for a variety of direct recreation opportunities on public and state lands that enable visitors to realize specific recreation experiences via numerous commercial and competitive activities or events.

Conditions on BLM-Administered Lands

The 12,618,026 acres of BLM-administered lands in the planning area offer a wide variety of recreational experiences, ranging from hunting and fishing, hiking, horseback riding, and mountain biking, to motorcycle and OHV riding, boating, driving for pleasure, and more. Each BLM field office manages its own recreation program; local social and environmental conditions, land use plans, and recreation facilities usually dictate the types of activities that occur in a given area.

Visitation has remained relatively stable since 2002, although some areas show small increases in visitor visits versus visitor use days, meaning some visitors are shortening or lengthening their trips. Likely due to the economic downturn, many recreational users are staying closer to home and utilizing recreation resources within commuting distance. **Table 3-29**, Average Annual Visitor Days from 2002 to 2012, displays the average annual visitor days for popular recreation areas on BLM-administered lands from fiscal years 2002 to 2012.

SRPs are issued for various commercial and non-commercial activities on BLM-administered lands. Primary commercial activities include hunting and guiding, rafting, fishing, and motorized vehicle events. Non-commercial SRPs are commonly issued for organized group activities including, but not limited to, bird watching, rare plant viewing, and non-commercial events organized by motorized and non-motorized recreational clubs.

Table 3-29
Average Annual Visitor Days from 2002 to 2012

District	Annual Visits	Average Annual Visitor Days[1]
Burns	436,080	739,153
Lakeview	322,921	155,242
Prineville[2]	153,464	656,345
Vale	673,173	1,892,893

Source: BLM 2012g
[1] A recreation visitor day is a compilation of visitors that use public lands for 12 hours combining a multitude of activities. For example, one visitor may participate in hiking for 3 hours; another in picnicking for 7 hours; and a third person is fishing for 2 hours. This equates to 1 visitor day.
[2] Central Oregon Resource Area only

There are a number of developed recreation sites (e.g., sites with one or more facility associated with them, such as a kiosk, boat launch, wayside, overlook, or pullout and interpretive signs) located within PPH and PGH or along rivers that bisect GRSG habitat (see **Table 3-30**, Developed Recreation Sites).

Table 3-30
Developed Recreation Sites

District	Resource Area	Number of Developed Recreation Sites[1]
Burns	Andrews	4
	Steens Mountain	24
	Three Rivers	5
Lakeview	Lakeview	4
	North Lake	11
Vale	Baker	28
	Jordan	37
	Malheur	8

Source: BLM 2012g
[1] Includes sites with one or more facility (e.g., kiosk, boat launch, wayside, overlook, or pullout and interpretive signs) located within or in close proximity to PPH and PGH.

3.8.2 Trends

Due to the remote nature of the planning area and its distance to metropolitan centers, recreation in many parts of the planning area is not expected to grow.

Five key drivers are causing changes to recreation in the planning area:

1. Changing public expectations and demand for outdoor recreation opportunities, especially for dispersed recreation
2. Continued growth in the recreation and tourism industries

3. Increased energy development in portions of the planning area
4. Close proximity of BLM-administered lands to private property, and the growing use of public lands as a community-based recreation asset
5. Technological advances, such as all-terrain vehicles and mountain bikes, affordable GPS units, as well as better outdoor equipment and clothing

These drivers will impact the activity opportunities that can be offered and the recreation experience and benefit opportunities that can be produced by land managers and partners.

3.9 TRAVEL MANAGEMENT

Off-highway vehicle (OHV) is synonymous with off-road vehicle. Off-road vehicle is defined in 43 CFR 8340.0-5(a):

> Off-road vehicle means any motorized/battery-powered vehicle capable of, or designed for, travel on or immediately over land, water, or other natural terrain, excluding: 1) Any non-amphibious registered motorboat; 2) Any military, fire, emergency, or law enforcement vehicle while being used for emergency purposes; 3) Any vehicle whose use is expressly authorized by the authorized officer or otherwise officially approved; 4) Vehicles in official use; and 5) Any combat or combat-support vehicle when used in times of national defense emergencies. Types of OHVs commonly used in the planning area include passenger cars, dirt motorcycles, dune buggies, sand rails, jeeps, four-wheel drive vehicles, snowmobiles, and ATVs.

The BLM's regulations for OHV management, 43 CFR 8342.1, stipulate "the authorized officer shall designate all BLM lands as either open, limited, or closed to [OHVs]." As such, all BLM-administered lands within the planning area have been designated in one of three OHV designation categories, as follows:

> Open area designations are used for intensive OHV or other transportation use areas where there are no special restrictions or where there are no compelling resource protection needs, user conflicts, or public safety issues to warrant limiting cross-country travel.
>
> Limited area designations are used where travel must be restricted to meet specific resource or resource-use objectives. For areas classified as limited, the BLM must consider a full range of possibilities, including travel that will be limited to types or modes of travel, such as foot, equestrian, bicycle, and motorized; limited to existing roads and trails; limited to time or season of use; limited to certain types of vehicles (e.g., motorcycles, ATVs, and high clearance); limited to licensed or permitted vehicles or users; limited to BLM administrative use only; or other types of limitations. In addition, the BLM must provide specific

guidance about the process for managing motorized vehicle access for authorized, permitted, or otherwise approved vehicles for those specific categories of motorized vehicle uses that are exempt from a limited designation.

Closed area designations prohibit any and all motorized travel and transportation. Areas or trails are designated closed if closure to all vehicular use is necessary to protect resources, promote visitor safety, or reduce use conflicts. Non-motorized uses are permitted in these areas.

Airstrips are areas that are "open" to cross country vehicle travel. When an aircraft lands, it is considered a motorized vehicle. Areas going to "limited" from "open" would no longer allow aircraft landing.

This section focuses on travel management; discussion of the relationship between motorized travel and wildlife can be found in **Section 3.2**, Greater Sage-Grouse and Sage-Grouse Habitat and **Section 3.4**, Fish and Wildlife.

3.9.1 Existing Conditions

Conditions of the Planning Area

Oregon is served by an extensive network of state and interstate highway systems. The National Highway System provides access to major metropolitan centers and smaller cities alike. Other national and state highways connect multiple municipalities and provide access to destinations like Crater Lake National Park.

Table 3-31, Roads within Greater Sage-Grouse Habitat, displays the miles of roads in the planning area that are located within sage-grouse habitat. **Table 3-32**, Railroads within Greater Sage-Grouse Habitat, displays the miles of railroads in the planning area that are located within sage-grouse habitat.

Over the past 10 years, federal land management agencies have instituted policies to provide networks of roads and trails for motorized access. 43 CFR 8230 requires the BLM to designate all BLM-administered lands as open, limited, or closed to OHV travel. This policy has resulted in the implementation of a system of designated roads and trails whereby cross-country travel is only allowed in specified areas, and motorized vehicles must stay on those routes designated for motorized travel.

In response to 36 CFR 212, Subpart B, the Forest Service has instituted a similar policy for motorized travel, requiring each national forest to produce a map that depicts the routes on which motorized vehicles are allowed to travel. In Oregon, nine National Scenic Areas, National Grasslands, and National Forests have published their Motor Vehicle Use Map (Forest Service 2012). The

Table 3-31
Roads within Greater Sage-Grouse Habitat

Surface Management Agency	Management Zone	Miles of Roads			Acres of Roads		
		Total[1]	Within PGH	Within PPH	Total[1]	Within PGH	Within PPH
BLM	IV	4,795	2,128	2,667	48,000	21,200	26,800
	V	3,908	5,511	3,357	88,400	54,800	33,600
Forest Service	IV	58	8	50	600	100	500
	V	491	356	135	4,800	3,500	1,300
Tribal and Other Federal	IV	58	34	24	500	300	200
	V	439	173	266	4,400	1,800	2,600
Private	IV	2,498	1,235	1,263	25,100	12,300	12,800
	V	4,115	2,798	1,317	40,400	27,800	13,600
State	IV	481	374	107	4,900	3,800	1,100
	V	308	201	107	3,100	2,000	1,100

Source: Manier et al. 2013
[1]Assumes footprint of 73.2 meters for interstate highways, 25.6 meters for primary and secondary highways, and 12.4 meters for other roads

Table 3-32
Railroads within Greater Sage-Grouse Habitat

Surface Management Agency	Management Zone	Miles of Railroads			Acres of Railroads[1]		
		Total	Within PGH	Within PPH	Total	Within PGH	Within PPH
BLM	IV	13	8	5	49	31	18
	V	0	0	0	0	0	0
Forest Service	IV	0	0	0	0	0	0
	V	1	1	0	0	3	0
Tribal and Other Federal	IV	0	0	0	0	0	0
	V	0	0	0	0	0	0
Private	IV	40	37	3	151	139	12
	V	17	17	0	65	65	0
State	IV	0	0	0	0	0	0
	V	0	0	0	0	0	0

Source: Manier et al. 2013
[1]Assumes footprint of 9.4 meters

remaining four National Forests are currently preparing their Motor Vehicle Use Maps.

Trail-based OHV use is prohibited in many National Park Service units, though driving for pleasure on paved roads is a popular activity.

On BLM- and National Park Service-administered and National Forest System lands, cross-country non-motorized travel remains largely permissible outside of some special designation areas. Mountain bicycle use is allowed on some designated trails and primitive roads within the National Parks System.

Conditions on BLM-Administered Lands

OHV use in the planning area is often associated with recreational activities (e.g., hunting, fishing, and driving for pleasure) and administrative purposes (e.g., livestock and facility management). Most motorized vehicular use in the planning area occurs on existing roads and trails, one intensively used Open area (Virtue Flats in the Baker Resource Area), and one managed trail system (Millican Valley in the Prineville Resource Area).

While route inventories on BLM-administered lands are incomplete, the number of acres managed as open, closed, or limited for OHVs in each RMP within the planning area is shown in **Table 3-33**, OHV Designations. Routine maintenance is conducted on all roads, routes, and trails.

Route designations for foot, horse, and bicycle travel have been implemented in some site-specific areas with their own implementation-level plans. Generally, cross-country foot, horse, and bicycle travel is allowed on most BLM-administered lands, although some field offices apply the same area and route limitations to bicycles and motorized vehicles. Historically, cross-country over-the-snow travel on most BLM-administered lands has not been restricted.

As in the remainder of the planning area, access can be seasonally limited on BLM-administered lands due to weather, resource concerns, or other limitations.

OHV Play Areas

There are two OHV play areas managed for intensive cross-country travel: Virtue Flats and Radar Hill.

Virtue Flats is located approximately 5 miles east of Baker City, entirely within PGH. It offers hills and rocky terrain with views of the Elkhorn and Wallowa Mountains and a variety of challenges for the beginner to advanced OHV enthusiast. Trails and routes are available year-round for all classes of OHVs, including motorcycles, four-wheels drives, snow machines, and quads. Additionally, this is also a popular mountain bike area and also includes equestrian activities. A staging area with seasonal restrooms, loading ramp,

Table 3-33
OHV Designations

RMP Area	Designation[1]	Within PGH	Within PPH	Outside GRSG Habitat
Lakeview	Open	709,424	637,579	465,619
	Closed	1,269	0	16,525
	Limited	648,637	337,549	575,467
Baker	Open	66,281	139,234	228,310
	Closed	0	0	0
	Limited	0	0	0
Southeast Oregon	Open	1,670,061	1,804,022	824,420
	Closed	983,541	942,158	219,262
	Limited	11,872	1,221	2,755
Brothers/LaPine	Open	0	0	0
	Closed	1,338	298	4,144
	Limited	17,107	11,763	60,890
Upper Deschutes	Open	0	0	0
	Closed	152,482	370	178,269
	Limited	26,552	0	97,460
Andrews	Open	529	0.5	24,768
	Closed	1103	94	3
	Limited	711,115	398,331	48,291
Steens	Open	0.2	0	0
	Closed	113,751	44,491	13,010
	Limited	84,810	163,575	8,999
Three Rivers	Open	656,911	188,111	284,475
	Closed	1,032	2,356	456
	Limited	46,696	18,099	33,460
Total	Open	3,103,206	2,768,947	1,827,592
	Closed	156,917	48,460	134,353
	Limited	2,644,388	1,871,845	1,124,638

Source: BLM 2012h
[1]"Limited" refers to areas where motorized travel is limited to either designated or existing routes

bulletin boards, maps, and parking is provided. Use of this area varies and is largely seasonal, with visitation peaking in late spring and early summer.

Radar Hill is a small OHV play area of less than 5,000 acres located near Burns, Oregon. It is not located within PPH or PGH. Use is largely from local users, with all vehicle types allowed.

3.9.2 Trends

Demand for public access in support of motorized uses is expected to continue to grow as the Pacific Northwest's population grows. Additional demands on BLM-administered lands will increase as the variety of motorized vehicles become more affordable and advances in equipment technology make BLM-administered lands more accessible to a wider range of users and age groups.

Current OHV use exceeds historic levels and new, more-powerful vehicles are capable of accessing steeper and rougher terrain. In the past, visitors drove principally Jeeps, trucks, and motorcycles. Today, the BLM has seen an increase in use of OHVs of all types and sizes. As with all types of use, increased visitation has contributed to the widening, deepening, braiding, and eroding of some existing routes as well as the development of numerous user created trails. The increased demand for cross-country opportunities has also led to an increasing number of hill-climb, play, and camping areas.

Some of the key drivers for the increase in travel in the planning area include:

- Increasing visitation on all BLM-administered lands within the planning area
- Increasing urban and suburban populations within the planning area
- Technological advances to all-terrain vehicles and mountain bikes, affordable GPS units, as well as better outdoor equipment and clothing.

3.10 LANDS AND REALTY

Lands and realty actions can be divided between land tenure adjustments, withdrawals, and land use authorizations. Land tenure adjustments focus primarily on land exchange, acquisition (including purchase and easement acquisition), and disposal. Withdrawals change the management of land and, in some cases, transfer jurisdiction but do not result in the transfer of ownership. Land use authorizations consist of ROW authorizations, communication sites, and other leases or permits.

Land Tenure Adjustments

Land tenure adjustments refer to those actions that result in the disposal of BLM-administered land, or the acquisition by the BLM of nonfederal lands or interests in land. FLPMA requires that public land be retained in public ownership unless, as a result of land use planning, disposal of certain parcels is warranted because it meets the criteria for disposal as outlined in 43 CFR 2710.0-3. These criteria are that: the tract was acquired for a specific purpose and the tract is no longer required for that or any other federal purpose; disposal of such tract shall serve important public objectives; or such tract is difficult and uneconomic to manage. Tracts of land that are designated in BLM LUPs as potentially available for disposal may also have a disposal method identified. Some lands would only be available for disposal via exchange with other lands identified for acquisition. However, the BLM will evaluate and consider the full range of land disposal and acquisition tools to be able to accomplish these objectives prior to proceeding with a land exchange. Subject to the disposal criteria discussed above, the BLM can also identify lands for straight disposal without an exchange. Lands and interests in lands are exchanged, acquired, and disposed of for the following reasons:

- Improve management of natural resources through consolidation of federal, state, and private lands
- Secure key property necessary to protect endangered species, promote biological diversity, increase recreational opportunities, and preserve archeological and historical resources
- Meet the needs of communities
- Implement specific acquisitions authorized or directed by acts of Congress
- Foster sustainable development and fulfill other public needs

Withdrawals

Withdrawals are used to preserve sensitive environmental values, protect major federal investments in facilities, support national security, and provide for public health and safety.

A withdrawal is a formal action that accomplishes one or more of the following actions:

- Transfers total or partial jurisdiction of federal land between federal agencies
- Closes federal lands to appropriation under public land laws, including mineral laws
- Dedicates public land for a specific public purpose

There are three major categories of formal withdrawals: (1) congressional, (2) administrative, and (3) Federal Power Act or Federal Energy Regulatory Commission. A withdrawal segregates a portion of public lands and suspends certain operations of the public land laws, such as mining claims. Certain stock driveways are also withdrawn. Federal policy is to restrict all withdrawals to the minimum time and acreage required to serve the public interest, maximize the use of withdrawn lands consistent with their primary purpose, and eliminate all withdrawals that are no longer needed.

Land Use Authorizations

The most common form of authorization to allow uses of BLM-administered lands by commercial, private, or governmental entities is the ROW. Per Title V of FLPMA, a ROW grant is an authorization to use a specific piece of BLM-administered land for certain projects (such as roads, pipelines, transmission lines, or communication sites) for a specific period of time.

ROW applications are reviewed using the criteria of following existing designated corridors wherever practical and avoiding proliferation of separate ROWs. The BLM's objective is to grant ROWs to any qualified individual,

business, or government entity, and to direct and control the use of ROWs on BLM-administered lands in a manner that:

- Is consistent with the objectives of the RMP
- Protects the natural resources associated with BLM-administered lands and adjacent lands, whether private or administered by a government entity
- Prevents unnecessary or undue degradation to BLM-administered lands
- Promotes the use of ROWs in common, considering engineering and technological compatibility, national security, and RMP goals and objectives
- Coordinates, to the fullest extent possible, all BLM actions with local, state, tribal, and other federal agencies; interested individuals; appropriate quasi-public entities (43 CFR 2801.2); and applicable planning documents (e.g. Harney County Renewable Energy Plan).

In addition to ROW authorizations, Title III of FLPMA gives the BLM the authority to authorize land use agreements such as special use permits, easements, and leases. These authorizations can be long term (greater than 3 years) leases, such as leases for communication facilities, or short-term (less than 3 years), such as permits for movie filming or apiaries.

3.10.1 Conditions of the Planning Area

The lands within the planning area are owned by multiple federal, state, and local agencies, as well as private landowners. The configuration of land ownerships and their proximity to each other is an important factor when considering land tenure adjustments and evaluating ROW applications. The planning area contains lands owned by the BLM, Forest Service, Bureau of Indian Affairs, private land owners, and other state and federal agencies.

Urbanization from community expansion is a contributing factor to overall GRSG health (Connelly et al. 2004). **Table 3-34**, Acres of Greater Sage-Grouse Habitat within City Limits in the Planning Area, displays data compiled in a baseline environmental report produced by the USGS and BLM (Manier et al. 2013). The table indicates acreages within the municipal boundary of a city or town presented by surface management agency and occurrence within PGH and PPH in the planning area.

Table 3-34
Acres of Greater Sage-Grouse Habitat within City Limits in the Planning Area

Surface Management Agency	Management Zone	Total Acres within City Limits	Acres within PGH	Acres within PPH
BLM	IV	100	100	0
	V	0	0	0
Forest Service	IV	0	0	0
	V	0	0	0
Tribal and Other Federal	IV	0	0	0
	V	100	100	0
Private	IV	200	200	0
	V	300	300	0
State	IV	0	0	0
	V	0	0	0
Other	IV	0	0	0
	V	0	0	0

Source: Manier et al. 2013

3.10.2 Conditions on BLM-Administered Lands

Land Tenure Adjustments

Land Status Zones
Within the planning area, BLM-administered lands have been classified for retention or disposal pursuant to Section 7 of the Taylor Grazing Act (43 USC 315f), FLPMA, and 43 CFR Subparts 2400 and 2500 and approved LUPs.

BLM-administered lands have been designated as three different zones (Zone 1, Zone 2, and Zone 3) and community expansion lands. Zone 1 lands have been identified as having national or statewide significance and are identified for retention in public ownership. These lands possess significant visual, wildlife, watershed, special status species, wilderness, recreational, vegetative, cultural, or other public values. Zone 2 lands have potentially high resource values for timber, recreation, riparian, watershed, special status species, cultural, and wildlife. Zone 2 lands are identified for retention or possible exchange for land with higher resource values or transfer through the Recreation and Public Purposes (R&PP) Act. Zone 3 lands are scattered, isolated tracts of BLM-administered lands having generally low or unknown resource values. Zone 3 lands are potentially suitable for transfer or disposal if significant recreation, wildlife, watershed, special status species, or cultural values are not identified. Community expansion lands possess high public values, due to their proximity to expanding communities, and provide important open space and dispersed recreation opportunities. These lands will be retained as undeveloped open space until such time as they may be transferred to another public entity to accommodate community expansion needs or used for other public purposes.

See **Table 3-35**, Land Status Zones, for the number of acres in each land status zone across BLM-administered lands in the planning area.

Table 3-35
Land Status Zones

Land Status Zone	Acres
Zone1*	***9,170,900***
PPH	3,501,400
PGH	4,142,300
Zone 2	***3,299,200***
PPH	991,700
PGH	1,468,500
Zone 3	***138,800***
PPH	50,400
PGH	48,600
Community Expansion	***5,200***
PPH	0
PGH	1,400

Source: Oregon/Washington BLM 2013
* Zone totals include the sum of GRSG habitat and non-habitat areas.

Disposals

Disposal areas include tracts of land that are economically difficult to manage or parcels that could serve important public objectives, including, but not limited to, expansion of communities and economic development. These lands are usually disposed of through land exchanges or land sales.

A land exchange is the process of trading lands or interests in lands. BLM-administered lands may be exchanged for lands or interests in lands owned by corporations, individuals, or government entities. Except for those exchanges that are congressionally mandated or judicially required, exchanges are voluntary and discretionary transactions with willing landowners. The lands to be exchanged must be of approximately equal monetary value and located within the same state. Exchanges also must be in the public interest and conform to applicable BLM LUPs.

Section 203 of FLPMA authorizes the sale of BLM-administered lands. The objective of BLM land sales is to provide a means for disposal of lands that are found, through the land use planning process to be suitable for disposal. BLM-administered lands must be sold at not less than fair market value and meet the sale criteria of the FLPMA.

There are approximately 39,700 acres of BLM-administered land in Zone 3 identified for disposal in the planning area located in the Burns District Office and identified in the Three Rivers and Andrews RMP.

There are approximately 54,300 acres of BLM-administered lands identified as Zone 3 and community expansion lands in the planning area located in Prineville District and identified in the Brothers La Pine and Upper Deschutes RMP.

There are approximately 7,758 acres of BLM-administered land in Zone 3 identified for disposal in the planning area, located in the Lakeview District and identified under the Lakeview RMP (BLM 2012i).

There are approximately 41,000 acres of BLM-administered land in Zone 2 and 62,100 acres in Zone 3 identified for disposal in the planning area located in the Vail District and identified in the Southeastern Oregon RMP.

There are two pending land exchanges within the planning area: one within the Three Rivers RMP and the other within the Steens Cooperative Management and Protection Area and Andrews RMP. The exchange in the Three Rivers RMP involves 720 acres of selected lands in PPH; 118 acres of offered land in PPH; and 320 acres of offered lands outside of the sage-grouse habitat area. The other land exchange involves mineral estate only and involves no surface ownership.

Acquisition

Acquisition of lands can be pursued to facilitate various resource management objectives. The BLM has the authority, under Section 205 of FLPMA, to purchase lands or interests in lands. The BLM also has the authority to receive lands through donation. Acquisition, either through purchase, exchange, or donation are used to enhance recreational opportunities, acquire crucial wildlife habitats, protect a site with cultural significance, or enhance a wilderness area or ACEC.

Withdrawals

There are approximately 212 withdrawals in the planning area, encompassing approximately 550,100 acres of federal land. These withdrawals are used for public water reserves, administrative sites, Department of Defense activities, research natural areas, and state wildlife reserves. There are 48,800 acres of military withdrawals in the planning area; however, these areas are located outside PPH and PGH (BLM 2012i).

Land Use Authorizations

Within the planning area, there are 361 active ROW authorizations. **Table 3-36**, Active ROW Authorizations, provides a summary by ROW type on BLM-administered land in the planning area.

Table 3-36
Active ROW Authorizations

Type	Number of Authorizations
Road	24
Railroad	29
Power	20
Telephone	21
Water facilities	9
Oil and gas	12
Communication sites	246
Total	361

Source: Oregon/Washington BLM 2013

To the extent possible, linear ROWs (such as roads and pipelines) are routed where impacts would be least disturbing to environmental resources, taking into account point of origin, point of destination, and purpose and need of the project. The ROWs are issued with surface reclamation stipulations and other mitigation measures. Restrictions and mitigation measures may be modified on a case-by-case basis, depending upon impacts on resources. The placement of major linear facilities depends upon meeting the following location criteria:

- Concentrate linear facilities within, or contiguous to, existing corridors, where possible
- Avoid locations that would take intensively managed forest land out of production
- Avoid locations that would harass livestock or wildlife
- Avoid steep topography, poor soils, or other fragile areas (such as Threatened and Endangered habitats)
- Avoid cultural sites that are listed on, or are eligible for listing on, the National Register of Historic Places

ROW Avoidance and Exclusion Areas

Areas unsuitable for surface disturbance or occupancy are generally identified as avoidance or exclusion areas for ROWs. Restrictions and mitigation measures are considered on a case-by-case basis for avoidance areas depending on impacts on resources, while exclusion areas are strictly prohibited from ROW development. **Table 3-37**, ROW Avoidance and Exclusion Areas, shows the acreage of lands in ROW avoidance areas and exclusion areas on BLM-administered lands within the planning area.

Table 3-37
ROW Avoidance and Exclusion Areas

	Avoidance Areas (Acres)	Exclusion Areas (Acres)
PPH	1,338,500	257,300
PGH	1,678,900	288,500
Total BLM-Administered Land	3,416,300	856,400

Source: Oregon/Washington BLM 2013

ROW Corridors

Utility corridors were developed to concentrate the effects of utility uses in suitable and manageable locations on BLM-administered lands. The corridors may contain power lines, transcontinental fiber optic communication cables, and inter- and intra-state gas pipelines.

There are seven major ROW corridors presently traversing the planning area. Three of the corridors contain large (500-kV or larger) power transmission lines. One runs east-west, north of Summer Lake and south of Christmas Valley, Oregon. A second north-south corridor traverses east of Fort Rock and Silver Lake, Oregon. A third corridor runs north-south, east of Christmas Valley and west of Adel, Oregon. The remaining three corridors are occupied by State Highways 31 and 140 and US Highway 395 (BLM 2012i). See **Table 3-38**, Utility Corridors within Greater Sage-Grouse Habitat in the Planning Area, shows the miles and acreage of utility corridors within the planning area for various land management agencies, including the BLM. **Table 3-31**, Roads within Greater Sage-Grouse Habitat, in **Section 3.9**, Travel Management provides information regarding existing roadways in the planning area.

Table 3-38
Utility Corridors within Greater Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Miles of Utility Corridors			Acres of Utility Corridors		
		Total[1]	Within PGH	Within PPH	Total[2]	Within PGH	Within PPH
BLM	IV	111	49	62	40,700	18,200	22,500
	V	171	111	60	87,700	48,500	39,200
Forest Service	IV	0	0	0	0	0	0
	V	0	0	0	5,800	5,700	100
Tribal and Other Federal	IV	0	0	0	100	100	0
	V	0	0	0	0	0	0
Private	IV	0	0	0	5,200	2,900	2,300
	V	0	0	0	11,100	6,200	4,900
State	IV	0	0	0	500	300	200
	V	0	0	0	1,700	0	1,700
Other	IV	0	0	0	0	0	0
	V	0	0	0	0	0	0

Source: Manier et al. 2013
[1]Includes Section 368 energy corridors
[2]Acreages calculated by buffering corridor centerlines with varying widths based on the corridor width itself

Communication Sites

Communication sites contain equipment for various public and private tenants, including phone companies; local utilities; and local, State, and other Federal agencies. Communication site applications are granted through a Communications Use Lease or a ROW grant. BLM-administered lands will continue to be available for multiple use and single use communication sites and road access ROWs on a case by case basis pursuant to Title V of FLPMA, and 43 CFR 2800 regulations.

There are a total of 246 communication site leases (ROWs) and 69 individual communication towers in the planning area. See **Table 3-39**, Number of Communication Towers within Greater Sage-Grouse Habitat in the Planning Area, which includes the number of communication towers on BLM- and non-BLM-administered land within GRSG habitat.

Table 3-39
Number of Communication Towers within Greater Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Number of Communication Towers[1]	Number within PGH	Number within PPH
BLM	IV	23	9	14
	V	46	34	12
Forest Service	IV	0	0	0
	V	16	16	0
Tribal and Other Federal	IV	0	0	0
	V	0	0	0
Private	IV	20	11	9
	V	22	16	6
State	IV	4	4	0
	V	3	3	0
Other	IV	0	0	0
	V	0	0	0

Source: Manier et al. 2013
[1]Displays the number of Federal Communication Commission communication towers

Transmission Lines

Transmission lines are linear ROW features authorized by the BLM. See **Table 3-40**, Miles of Transmission Lines within Greater Sage-Grouse Habitat in the Planning Area, which includes miles of transmission lines in PPH and PGH by surface management agency.

Table 3-40
Miles of Transmission Lines within Greater Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Miles[1]	Miles within PGH	Miles within PPH
BLM	IV	11,400	6,600	4,800
	V	41,500	25,100	16,400
Forest Service	IV	0	0	0
	V	1,300	1,300	0
Tribal and Other Federal	IV	0	0	0
	V	800	800	0
Private	IV	2,600	1,100	1,500
	V	11,100	6,800	4,300
State	IV	400	100	300
	V	400	200	200
Other	IV	0	0	0
	V	0	0	0

Source: Manier et al. 2013
[1]Includes transmission lines greater than 115kV

Renewable Energy

Solar, wind, and biomass are considered renewable energy resources (geothermal is managed as a fluid leasable mineral). Solar and wind are authorized by ROWs through the Lands and Realty Program. Any forest products removed from BLM-administered lands, including biomass, would be authorized via a forest product sale permit, as a stewardship contract, or free use permit.

There are currently no ROW acres for solar energy and no biomass facilities in the planning area. The Vale District has issued two ROWs for access to utilize geothermal resources on private mineral estate at the Neal Hot Springs Project.

There are eight wind testing facilities and one wind development ROW (see **Table 3-41**, Acres of Wind Energy Rights-of-Way within Greater Sage-Grouse Habitat in the Planning Area).

Table 3-41
Acres of Wind Energy Rights-of-Way within Greater Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres	Acres within PGH	Acres within PPH
BLM	IV	811,200	276,100	535,100
	V	197,100	96,500	100,600
Forest Service	IV	0	0	0
	V	0	0	0

Table 3-41
Acres of Wind Energy Rights-of-Way within Greater Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres	Acres within PGH	Acres within PPH
Tribal and Other Federal	IV	1,800	100	1,700
	V	0	0	0
Private	IV	10,500	1,100	9,400
	V	4,800	3,200	1,600
State	IV	300	300	0
	V	0	0	0
Other	IV	0	0	0
	V	0	0	0

Source: Manier et al. 2013

3.10.3 Trends

Land Tenure Adjustments

The BLM will process land exchanges, acquisitions, easements, and potential sales within the planning area on a case-by-case basis as staff and workload allow. As opportunities present themselves, each proposal will be reviewed and given careful consideration to management goals and public benefit. In recent years, there is a trend for land tenure adjustment legislation to be considered and adopted as part of the legislative process. Congressionally mandated land tenure actions could continue to affect lands identified for disposal, acquisition or exchange. Otherwise, the land tenure program receives few land tenure adjustment requests per year and it is anticipated that this program will continue to experience low levels of activity.

Land Use Authorizations

Demand for land use authorizations in the planning area is expected to remain steady or gradually increase over time, particularly in response to inter- and intra-state energy, gas ROW development, and energy projects. The BLM anticipates land use authorizations associated with renewable energy projects, primarily utility-scale wind energy generation, to remain steady or gradually increase. The BLM anticipates that ROW authorizations for communication sites, roads, distribution lines, and other local-scale ROWs will remain at current levels.

3.11 FLUID LEASABLE MINERALS

Fluid leasable minerals in the planning area include conventional oil and gas and geothermal resources. Fluid leasable minerals are governed by the Mineral Leasing Act of 1920 (February 1920; and 43 CFR 3000-3599, 1990), as amended, which authorized specific minerals to be disposed of through a leasing system. Geothermal resources are governed by the Geothermal Steam Act of 1970.

Acreage in this section refers to the federal mineral estate. The federal mineral estate includes BLM-administered minerals that occur beneath surface estate managed by the BLM, as well as beneath surface estate within state or private jurisdiction (known as split-estate lands). The total federal mineral estate within the planning area is 15,257,035 acres (12,618,028 acres BLM-administered surface and 2,639,007 acres private, state, or other federal surface with federal minerals).

Minerals data was compiled in a BER produced by the USGS and BLM (Manier et al. 2013) (**Appendix O**, Mineral Resources from Baseline Environmental Report). This report provides estimated acreages by surface management agency and their occurrence within PGH and PPH in the planning area by management zone. Discrepancies between BER data and data found in this section exist due to data keeping and mapping differences. As such, data found in the BER will only serve as the baseline for Chapter 5 (Cumulative Impacts), because these are the best available data covering the entire GRSG range. However, because localized data are available at a finer scale for the Oregon sub-region, the BER data will not be incorporated into the Chapter 4 (Environmental Consequences) analysis.

3.11.1 Existing Conditions

Leasable minerals are defined by the Mineral Leasing Act. The rights to explore for and produce fluid minerals on public land may be acquired through leasing. During the leasing process, the BLM may apply stipulations (no surface occupancy [NSO], controlled surface use [CSU], and timing limitation [TL]) to leases in order to protect a wide range of resources including soils, watersheds, cultural resources, and wildlife (e.g., sage-grouse). Stipulations, while not directly closing an area to fluid mineral leasing, impact the availability of fluid mineral resources by restricting the location of surface facilities and methods of development.

No Surface Occupancy (NSO). In areas where NSO stipulations are applied, federal fluid minerals could be leased, but the leaseholder/operator would have to use off-site methods, such as directional drilling to access the mineral resource.

Controlled Surface Use (CSU). CSU stipulations allow some use and occupancy in areas where they are applied. While less restrictive than an NSO, a CSU stipulation allows the BLM to require special operational constraints, to shift the surface-disturbing activity associated with fluid mineral leasing more than the standard 200 meters (656 feet), or to require additional protective measures (e.g., special construction techniques for preventing erosion in sensitive soils) to protect the specified resource or value.

Timing Limitations (TL). Areas where TL stipulations are applied are temporarily closed to fluid mineral exploration and development, surface-disturbing

activities, and intensive human activity during identified time frames, usually based on seasons or species breeding times. While some operational activities would be allowed at all times (e.g., vehicle travel and maintenance), construction, drilling, completions, and other operations considered to be intensive in nature would not be allowed during the restricted time frame.

Conditions of the Planning Area

The planning area contains possible and potential leasable fluid minerals that include oil, gas, and geothermal resources. Oregon is considered a pioneering area, which is an area of unknown potential. There is no developed infrastructure, and limited exploration has occurred. Because of the lack of infrastructure and experienced workforce, initial exploration costs and profit risk would be much higher than in areas associated with developed fields. Therefore, as long as economic resource exists in other areas with fluid mineral development, focused exploration and development in the pioneering areas would not likely occur until such time that economics increase to make exploration and development warranted. While there has been a recent decline in oil and gas leasing and exploration on BLM-administered and private lands in the planning area, there has been a marked increase in geothermal interest, including the recent development of a producing geothermal facility on private land in Eastern Oregon.

Oil and Gas

As described above, Oregon is a pioneering locality for oil and gas. While there has been a continuous interest in petroleum in eastern Oregon and leases for oil and gas are issued, the interest has declined in recent years for the reasons also listed above. **Table 3-42**, Federal Oil and Gas Acreage Leased by Year, represents lease acreage sales per year in Oregon. However, many of the leases have been relinquished. As of May 17, 2013, there were 125 oil and gas leases encompassing 204,691 acres of federal mineral estate (these numbers account for the number of leases that have been relinquished) (Oregon/Washington BLM 2013). While leases have been issued for oil and gas, there have been no wells developed on these leases.

As shown in **Table 3-42**, Oregon realized a drastic increase in natural gas interest in 2006 (182 leases issued). The previous year, 2005, experienced peaks of natural gas value, reaching $10.33 per thousand cubic feet at wellhead in October, with maintained values above $9.00 for the subsequent months (EIA 2013). This increase in value was from a previous low of $5.30 per thousand the year before. This increase in value would make leasing for exploration viable in areas not yet proven, such as both eastern and western Oregon. As such, there was a drastic increase in industry lease nominations, resulting in offerings the following year (2006). The time delay was due to required process needed in RMP and NEPA evaluation of areas. Lease interest was not maintained, as 2006 saw a steady decrease in wellhead values, with October 2006 having a national

Table 3-42
Federal Oil and Gas Acreage Leased by Year

Year	Number of New Leases	Acres Leased	Year	Number of New Leases	Acres Leased
1996	10	28,418	2007	3	4,335
1997	1	80	2008	5	14,357
1998	4	3,593	2009	6	7,733
1999	4	15,043	2010	0	0
2000	1	160	2011	0	0
2001	4	4,112	2012	0	0
2002	7	5,166	2013	0	0
2003	0	0	Total	229	358,313
2004	0	0			
2005	2	1,794			
2006	182	273,522	*Average Acres:*		*21,077*

Source: BLM 2013c

value of $5.09 per thousand. Not only was there a drop in lease nominations, reflected in the 2007 numbers, but many leases purchased in 2006 have been relinquished. An increase in wellhead values for natural gas may once again result in an increase of interest and lease nominations to explore potential natural gas resources.

Table 3-43, Fluid Mineral Leasing in the Decision Area, illustrates the total acreage of the federal mineral estate closed to leasing, open to leasing subject to standard terms and conditions (i.e., not subject to additional stipulations), and open to leasing subject to stipulations (NSO, CSU, and TL).

There are approximately 3,134,159 acres of federal mineral estate closed to leasing within the decision area, of which 1,150,259 acres and 1,577,983 acres are within PPH and PGH, respectively. About 8,513,880 acres of federal mineral estate (2,639,007 acres of which is split-estate) are open to leasing subject to standard terms and conditions. This includes 2,428,521 acres in PPH (of which 209,824 acres are split-estate) and 2,549,563 acres in PGH (of which 69,826 acres are split-estate). The aforementioned lands are not subject to stipulations (e.g., NSO, CSU, and TL). There are an additional 905,983 acres of federal mineral estate open to leasing subject to NSO stipulations and 2,703,012 acres of federal mineral estate open to leasing subject to CSU and TL stipulations.

Geothermal Leasing

As illustrated in **Table 3-43**, approximately 8,513,880 acres of federal mineral estate in the decision area are managed as open to leasing, including 2,639,007 acres of split-estate. Approximately 3,134,159 acres of federal mineral estate comprised entirely of BLM-administered surface lands are closed to leasing. The

Table 3-43
Fluid Mineral Leasing in the Decision Area

Leasing Categories	Decision Area	PPH	PGH	Other Areas[1]
Closed to fluid mineral leasing (Total Federal Mineral Estate)	3,134,159	1,150,259	1,577,983	405,918
Leased				
Closed to leasing—BLM surface/federal minerals	0	0	0	0
Closed to leasing—Private or State surface/federal minerals	0	0	0	0
Unleased				
Closed to leasing—BLM surface/federal minerals	3,134,159	1,150,259	1,577,983	405,918
Closed to leasing—Private or State surface/federal minerals	0	0	0	0
Open to leasing subject to standard terms and conditions (i.e., not subject to NSO, CSU, or TL stipulations) (Total Federal Mineral Estate)	8,513,880	2,428,521	2,549,563	3,535,796
Leased				
Open to leasing subject to standard terms and conditions (i.e., not subject to NSO, CSU, or TL stipulations)—BLM surface/federal minerals	56,425	7,131	17,863	31,431
Open to leasing subject to standard terms and conditions (i.e., not subject to NSO, CSU, or TL stipulations)—Private or State surface/federal minerals	0	0	0	0
Unleased				
Open to leasing subject to standard terms and conditions (i.e., not subject to NSO, CSU, or TL stipulations)—BLM surface/federal minerals	5,818,448	2,211,566	2,461,874	1,145,008
Open to leasing subject to standard terms and conditions (i.e., not subject to NSO, CSU, or TL stipulations)—Private or State surface/federal minerals	2,639,007	209,824	69,826	2,359,357
Open to leasing subject to No Surface Occupancy (NSO) (Total Federal Mineral Estate)	905,983	305,238	405,932	194,813
Leased				
Open to leasing subject to No Surface Occupancy (NSO)—BLM surface/federal minerals	10,660	142	62	10,456
Open to leasing subject to No Surface Occupancy (NSO)— Private or State surface/federal minerals	0	0	0	0

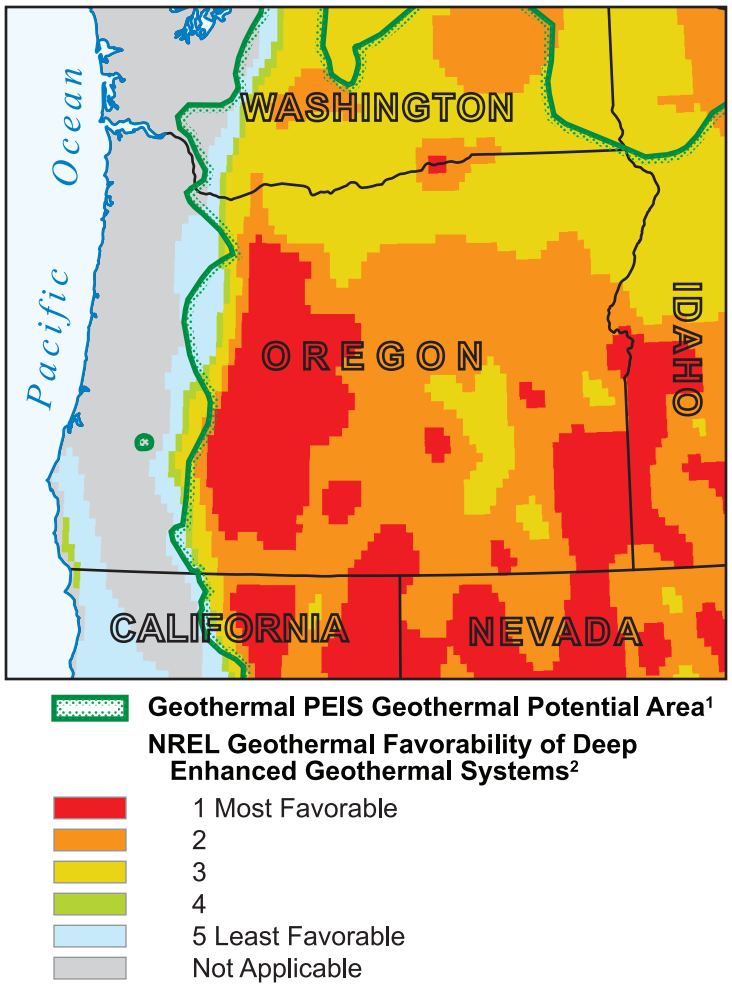
Table 3-43
Fluid Mineral Leasing in the Decision Area

Leasing Categories	Decision Area	PPH	PGH	Other Areas[1]
Unleased				
Open to leasing subject to No Surface Occupancy (NSO)—BLM surface/federal minerals	895,323	305,096	405,870	184,357
Open to leasing subject to No Surface Occupancy (NSO)— Private or State surface/federal minerals	0	0	0	0
Open to leasing subject to Controlled Surface Use (CSU/TL) (Total Federal Mineral Estate)	2,703,012	872,849	1,198,980	631,183
Leased				
Open to leasing subject to Controlled Surface Use (CSU/TL)—BLM surface/federal minerals	142,708	5,283	50,700	86,725
Open to leasing subject to Controlled Surface Use (CSU/TL)— Private or State surface/federal minerals	0	0	0	0
Unleased				
Open to leasing subject to Controlled Surface Use (CSU/TL)—BLM surface/federal minerals	2,560,304	867,566	1,148,280	544,458
Open to leasing subject to Controlled Surface Use (CSU/TL)— Private or State surface/federal minerals	0	0	0	0
Total Federal Mineral Estate	**15,257,034**	**4,756,867**	**5,732,458**	**4,767,710**

Source: Oregon/Washington BLM 2013
[1]Other Areas are defined as areas outside of PPH and PGH that contribute to the acreage within the sage-grouse planning area.

2008 Geothermal Programmatic EIS (BLM and Forest Service 2008) identifies the majority of the planning area as having potential for geothermal resource (see **Figure 3-8**, Geothermal Energy Potential). While under explored, interest and study of the potential resource is being completed by governmental, academic, and private entities.

Similar to oil and gas resources described above, while there is geothermal interest and lease activity, no geothermal wells have yet been developed on BLM-administered lands in the planning area. However, BLM issued a Finding of No Significant Impact in July 2013 to permit geothermal exploration and production wells on BLM-administered lands. All of the approved wells will be in Lake County, but the project will include some lands in Harney County as well.



[1] *Idaho National Engineering and Environmental Laboratory, 2003*

[2] *Southern Methodist University Geothermal Laboratory, Blackwell & Richards, 2009 and National Renewable Energy Laboratory, 2009*

Figure 3-8: Geothermal Energy Potential

The potential for development of the geothermal resource is realized from two critical factors, the diversified geology of Oregon and developing technical advances of geothermal production. Central and Eastern Oregon geology is young in the perspective of geologic time. The entire area is influenced by both recent volcanism and tectonic extension. The young age of the Cascade caldera systems and the Western Volcanoes provide for shallow high temperature dry and wet geothermal resources (Orr et al. 1992). Small-scale private entities have used these resources for energy and recreation, ranging from home heating systems to utilizing surface hot springs.

Related to the caldera systems and extending into the planning area is the tectonic extension system of southern Central and Eastern Oregon. This extension province is the northwestern extent of the "Basin and Range" Province of Nevada and California. The earth's crust is thinning, being stretched by rotation, movement, and interaction of the tectonic plates in this area. This results in a "horst and grabben" structure, with uplifted and subsided blocks creating basins and mountain ranges. The net result of this extension and thinning of the crust is a very steep thermal gradient allowing for economic resource at shallow depths. The northern and northeastern portion of the state may have some influence from both the Cascade caldera and extension systems. However, it is capped by the recent volcanisms of the Columbia River Basalt. These consist of flood basalt flows up to multi-thousands of feet thick. While they are old enough that they may not have the shallow thermal gradient signatures of the extension and Cascade caldera systems, they maintain thermal prospects, much of which has not yet been explored.

The second factor that is increasing potential for geothermal development is the rapid advancement of technology. While at one time a dry hole (a prospect with heat but not fluid) was not commercially economical, new technologies such as Enhanced Geothermal Systems are providing a venue to not only make dry holes productive but also allow economic development of moderate and low-grade temperature gradients. The economics of developing Oregon's geothermal potential is becoming increasingly favorable.

3.11.2 Trends

A reasonably foreseeable development scenario was not completed for this exercise. All future-looking estimates are based on broad scaled "trends" review, which is an opinion as opposed to a methodological approach. The exception is a national-scale reasonably foreseeable development scenario completed for the 2008 Geothermal PEIS.

Oil and Gas

The planning area contains possible and potential leasable fluid minerals that include oil, gas, and geothermal resources. However, as described above, Oregon is considered a pioneering area. As was realized in 2006, focused exploration and development is sluggish in the pioneering areas until such time

that economics increase, or supply decreases, to make exploration and development warranted. The current decline in oil and gas leases is expected to continue in the near future.

Geothermal Leasing
The main long-term trend that is expected to influence geothermal energy development within the planning area is the ongoing national rapid expansion of renewable energy development and the possible future trend toward locally produced renewable energy.

While there has been a recent decline in oil and gas leasing and exploration on public and private lands, there has been a marked increase in geothermal interest, including the development of a producing geothermal facility on private land in Eastern Oregon. It is expected that the development of Enhanced Geothermal Systems will increase the potential return from dry geothermal systems as well as lower temperature systems. Geothermal exploration for commercial production is expected on lands within the planning area over the next 10 to 15 years.

3.12 LOCATABLE MINERALS

3.12.1 Existing Conditions

Locatable minerals in the planning area include, but are not limited to borax, gold, silver, lead-silver-zinc, dimension stone, copper, mercury, limestone, zeolites, diatomaceous earth, uranium, kaolinite, perlite, and gemstones-sunstone. Claim documentation also lists iron, arsenic, and bentonite. Other locatable minerals that would require a common/uncommon variety review or are considered a "recreational" mineral include jasper, oolites, opal, geodes (thunder eggs), granite, and agate.

Mineral exploration and the development of locatable mineral deposits are allowed under the General Mining Law of 1872 on all BLM-administered lands, unless they are withdrawn from mineral entry by a prior Secretarial Public Land Order or an act of Congress. Subject to valid existing rights, these areas are withdrawn from further location of mining claims or sites. To restrict locatable mineral development, the BLM must petition the Secretary of the Interior for withdrawal actions, with subsequent valid existing rights reviews for existing claims.

Acreage in this section refers to the federal mineral estate. The federal mineral estate includes BLM-administered federal minerals that occur beneath surface estate managed by the BLM, as well as beneath surface estate within state or private jurisdiction (known as split-estate lands). The total federal mineral estate within the planning area is 15,257,035 acres (12,618,028 acres BLM-administered surface land and 2,639,007 acres private, state, or other federal surface with federal minerals).

Minerals data was compiled in a BER produced by the USGS and BLM (Manier et al. 2013) (**Appendix O**, Mineral Resources from Baseline Environmental Report). This report provides estimated acreages by surface management agency and their occurrence within PGH and PPH in the planning area by management zone. Discrepancies between BER data and data found in this section exist due to data keeping and mapping differences. As such, data found in the BER will only serve as the baseline for Chapter 5 (Cumulative Impacts), because these are the best available data covering the entire GRSG range. However, because localized data are available at a finer scale for the Oregon sub-region, the BER data will not be incorporated into the Chapter 4 (Environmental Consequences) analysis.

Conditions of the Planning Area

Table 3-44, Locatable Minerals in the Decision Area, illustrates the total acreage of the federal mineral withdrawn from locatable mineral entry, petitioned for withdrawal from locatable mineral entry, and open to locatable mineral exploration or development.

Table 3-44
Locatable Minerals in the Decision Area

	Decision Area	PPH	PGH	Other Areas[1]
Withdrawn from locatable mineral entry (Total Federal Mineral Estate)	996,760	254,777	562,489	179,493
Withdrawn from locatable mineral entry —BLM surface/federal minerals	996,760	254,777	562,489	179,493
Withdrawn from locatable mineral entry —Private or State surface/federal minerals	0	0	0	0
Petitioned for withdrawal from locatable mineral entry (Total Federal Mineral Estate)	20,453	12,835	7,616	3
Petition for withdrawal from locatable mineral entry —BLM surface/federal minerals	20,453	12,835	7,616	3
Petition for withdrawal from locatable mineral entry —Private or State surface/federal minerals	0	0	0	0
Open to locatable mineral exploration or development (Total Federal Mineral Estate)	14,239,821	4,489,255	5,162,353	4,588,213
Open to locatable mineral exploration or development — BLM surface/federal minerals	10,618,667	3,932,357	4,684,771	2,001,539

Table 3-44
Locatable Minerals in the Decision Area

	Decision Area	PPH	PGH	Other Areas[1]
Open to locatable mineral exploration or development — Private or State surface/federal minerals	2,639,007	209,824	69,826	2,359,357
Wilderness Study Area/No Reclamation/Other[2]	982,147	347,074	407,756	227,317
Total Federal Mineral Estate	**15,257,034**	**4,756,867**	**5,732,458**	**4,767,710**

Source: Oregon/Washington BLM 2013
[1]Other Areas are defined as areas outside of PPH and PGH that contribute to the acreage within the sage-grouse planning area.
[2] Developing locatable minerals in these areas would require a Plan of Operations according to 43 CFR 3802 and 43 CFR 3809.11.

Approximately 996,760 acres of the total federal mineral estate for locatable minerals are withdrawn to the location of mining claims. An additional 20,453 acres have been identified to be petitioned for withdrawal from the Secretary of the Interior. A total of 14,239,821 acres of the federal mineral estate (including 2,639,007 acres of split-estate) for locatable minerals are open to locatable mineral exploration and development.

Table 3-45, Locatable Minerals Claims, Plans of Operations, and Notices, illustrates the number and acres of claims, plans of operation, and notices on BLM-administered surface lands in the planning area. As of March 22, 2013, there are 671 mining claims encompassing approximately 94,441 acres within PPH and PGH. Of that, 50,597 acres are within PPH and 43,843 acres are within PGH. There are 128 notices covering approximately 18,552 acres, and 136 approved plans of operation, covering 29,394 acres. There is one plan of operation (encompassing 40 acres) not yet approved within PGH; no plans of operations are within PPH (Oregon/Washington BLM 2013). For mineral activities such as Casual Use and Plans of Operations, see 43 CFR 3809.

All locatable minerals have potential to exist within the planning area but exploration efforts have been minimal so potential is unknown. Mineral Potential Reports completed for past RMP efforts are out of date because new technologies, techniques, and developments could make what was once identified as low potential now high.

There is locatable mineral exploration and production occurring through central Oregon. In BLM-administered areas managed as open to locatable mineral exploration and development, minerals of commercial interest include diatomaceous earth, limestone, perlite, sunstone, bentonite, and gold:

Table 3-45
Locatable Minerals Claims, Plans of Operations, and Notices

	Planning Area	PPH	PGH	Total PPH/PGH	Other Areas[1]
Mining Claims	1,544 *(252,607 acres)*	293 *(50,597 acres)*	378 *(43,844 acres)*	671 *(94,441 acres)*	873 *(158,159 acres)*
Notices	215 *(47,709 acres)*	65 *(9,545 acres)*	63 *(9,007 acres)*	*128 (18,552 acres)*	87 *(10,605 acres)*
Plans of Operation – Approved	186 *(37,447 acres)*	45 *(7,442 acres)*	91 *(21,952 acres)*	*136 (29,394 acres)*	50 *(8,054 acres)*
Plans of Operation – Not Yet Approved	26 *(2,193 acres)*	0 *(0 acres)*	1 *(40 acres)*	*1 (40 acres)*	25 *(2,153 acres)*

Source: Oregon/Washington BLM 2013

- Diatomaceous earth mines are operating and expanding within the Burns and Vale Districts.
- One limestone mine is operating in the Baker Resource Area.
- Perlite and sunstone are being mined in the Lakeview District.
- Bentonite is being mined in Prineville District, with historic interest in other districts.
- Placer gold mines are operating and expanding in all of the districts.

3.12.2 Trends

A Mineral Potential Report was not completed for this RMPA/EIS. All estimates are based on broad scaled "trends" review, which is an opinion as opposed to a methodological approach.

There is potential for economic development of locatable minerals. The planning area consists of geology preferential to the formation of precious and semi-precious locatable minerals, as well as uncommon variety. However the area is under-utilized and under-analyzed.

Trends for development are based on economic value and exploration. Increasing precious metal and industrial mineral values will increase interest in location (filing of claims), exploration (filing of Notices), and development (filing of plans of operation). As initial projects, it can be anticipated that additional resources will be found, and original prospect boundaries will likely be increased, as with future expansion of current diatomaceous earth projects.

Notices and plan of operations are expected to increase, based on price of precious metals and industrial minerals. This is based on past increase of Notices and plan of operations submittals compared to increasing gold values

and depressed economic conditions. There are no indications of changes in any of the variables, therefore, claims, notices, and plan of operations are expected to increase as new discoveries are realized.

Given the increasing value and scarcity of minerals, it is expected the claim acreage is to remain the same or increase in the foreseeable future, depending on resource prices and regulatory fees.

3.13 MINERAL MATERIALS

3.13.1 Existing Conditions

Mineral materials in the planning area include, but are not limited to, common varieties of construction materials and aggregates such as sand, gravel, cinders, roadbed, landscape boulders, decorative rock, dimension stone, and ballast material.

Mineral materials are sold or permitted under the Mineral Materials Sale Act of 1947 and Federal Aid Highway Act of 1921. Mineral materials are sold at a fair market value or through free use permits to governmental agencies. Local government agencies and non-profit organizations may obtain these materials free of cost for community purposes. County and state road construction divisions obtain rock for road surfacing material and are significant users of gravel and sand resources.

Sand, gravel, and crushed rock used as construction aggregates are an extremely important resource. The extraction of the resource, which is necessary for that infrastructure development, varies directly with the amount and kind of development (road building and maintenance and urban development) nearby. More than for other resources, however, the proximity of both transportation and markets are key elements in the development of a deposit.

Acreage in this section refers to the federal mineral estate. The federal mineral estate includes BLM-administered federal minerals that occur beneath surface estate managed by the BLM, as well as beneath surface estate within state or private jurisdiction (known as split-estate lands). The total federal mineral estate within the planning area is 15,257,035 acres (12,618,028 acres BLM-administered surface land and 2,639,007 acres private, state, or other federal surface with federal minerals).

Minerals data was compiled in a BER produced by the USGS and BLM (Manier et al. 2013) (**Appendix O**, Mineral Resources from Baseline Environmental Report). This report provides estimated acreages by surface management agency and their occurrence within PGH and PPH in the planning area by management zone. Discrepancies between BER data and data found in this section exist due to data keeping and mapping differences. As such, data found in the BER will only serve as the baseline for Chapter 5 (Cumulative Impacts), because these are the best available data covering the entire GRSG range.

However, because localized data are available at a finer scale for the Oregon sub-region, the BER data will not be incorporated into the Chapter 4 (Environmental Consequences) analysis.

Conditions of the Planning Area

Nearly all BLM-administered land in the planning area has some potential for production of mineral materials. These include clay, cinders, sand and gravel, crushable rock, and common variety facing stone. Most of the planning area has a moderate to high potential for the occurrence of mineral materials.

Demand for mineral materials typically exists near population centers and along major roadways. For example, population growth in central Oregon has led to an increasing need for mineral materials to build and maintain roads and highways. Aggregate is used in concrete and is the base used for most structures and building projects. Mineral materials are also used for bridges and other infrastructure projects, including the development of renewable energy systems.

Approximately 2,091,631 acres of federal mineral estate are closed to mineral material disposal (**Table 3-46**, Mineral Materials in the Decision Area). An additional 660,903 acres of federal mineral estate are subject to an NSO stipulation. Disposition of mineral materials requires surface mining, so NSO stipulations applied to actions associated with mining mineral material would effectively close these areas to mineral mining unless an exception was granted. Mineral development could occur on the remaining 11,665,024 acres of federal mineral estate open but not subject to stipulations (comprised of 9,026,017 acres of BLM-administered surface lands and 2,639,007 acres of split-estate), and 839,476 acres of BLM-administered surface lands open and subject to CSU/TL stipulations.

3.13.2 Trends

A mineral potential report was not completed for this RMPA/EIS. All estimates are based on broad scaled "trends" review, which is an opinion as opposed to a methodological approach.

Future demand for mineral materials will vary depending upon market conditions, which differ according to economic conditions and construction activity. The BLM expects that, as the current recession ends and demand for renewable energy projects increases, construction activity will increase and economic conditions will improve, resulting in an increased demand for construction materials including gravel from areas within the sage-grouse planning area. The BLM and county road departments routinely extract rock for aggregate and rip-rap for road construction and repairs, and sand and gravel for road maintenance; this use is reasonably consistent. Additionally, it is expected that local governments and private construction firms may increasingly look to BLM-administered lands for aggregate sources during the life of this plan, which

Table 3-46
Mineral Materials in the Decision Area

	Decision Area	PPH	PGH	Other Areas[1]
Closed to mineral material disposal (Total Federal Mineral Estate)	2,091,631	646,426	998,197	447,009
Closed to mineral material disposal —BLM surface/federal minerals	2,091,631	646,426	998,197	447,009
Closed to mineral material disposal — Private or State surface/federal minerals	0	0	0	0
Open for consideration of mineral materials disposal (not subject to stipulations) (Total Federal Mineral Estate)	11,665,024	3,699,557	4,029,299	3,936,168
Open for consideration of mineral material disposal —BLM surface/federal minerals	9,026,017	3,489,733	3,959,473	1,576,811
Open for consideration of mineral material disposal —Private or State surface/federal minerals	2,639,007	209,824	69,826	2,359,357
Open for consideration of mineral material disposal subject to NSO stipulations (de facto closure) (Total Federal Mineral Estate)	660,903	279,680	311,722	69,501
NSO Stipulations (de facto closure) —BLM surface/federal minerals	660,903	279,680	311,722	69,501
NSO Stipulations (de facto closure)—Private or State surface/federal minerals	0	0	0	0
Open for consideration of mineral material disposal subject to CSU/TL stipulations (Total Federal Mineral Estate)	839,476	131,204	393,240	315,032
CSU/TL Stipulations—BLM surface/federal minerals	839,476	131,204	393,240	315,032
CSU/TL Stipulations—Private or State surface/federal minerals	0	0	0	0
Total Federal Mineral Estate	**15,257,034**	**4,756,867**	**5,732,458**	**4,767,710**

Source: Oregon/Washington BLM 2013
[1]Other areas are defined as areas outside of PPH and PGH that contribute to the acreage within the sage-grouse planning area.

would lead to new mineral authorizations for negotiated and non-negotiated sales, free use permits, community pits/common use areas, and authorizations under Title 23 of FHWA.

3.14 NONENERGY LEASABLE MINERALS

3.14.1 Existing Conditions

Nonenergy solid leasable minerals in the planning area are undetermined, but may include sodium, potash, and other evaporate deposits. Nonenergy solid

leasable minerals are governed by the Mineral Leasing Act of 1920, as amended, which authorized specific minerals to be disposed of through a leasing system. Nonenergy solid leasable minerals in the planning area include revested mineral estates (i.e., lands brought back to the BLM through purchase or donation).

Conditions of the Planning Area

Mineral Potential Reports are not completed for traditional nonenergy solid leasables or metals and minerals that are normally locatable or that can be considered nonenergy solid leasable minerals on certain acquired lands (e.g., BLM-administered land gained through purchase or donation). Coupled with the fact that there is currently no commercial interest in nonenergy solid leasables, this means that the potential is unknown.

3.14.2 Trends

Reasonably foreseeable development scenarios and Mineral Potential Reports were not completed for this RMPA/EIS. All estimates are based on broad scaled "trends" review, which is an opinion as opposed to a methodological approach.

The geologic condition provides only minor traditional nonenergy solid leasable mineral potentials. Therefore, economic occurrences are unlikely, and, as such, probable trends would be minimal development of traditional solid leasable minerals.

However, precious, semi-precious, and uncommon variety minerals contained within acquired lands may be considered leasable commodities (rather than locatable minerals). Trends for development of these leasable materials are the same as that identified for locatable minerals.

3.15 SPECIAL DESIGNATIONS

This section is a description of the special designation areas in the planning area and follows the order of topics addressed in Chapter 2:

- Wilderness Areas
- Wilderness Study Areas
- Cooperative Management and Protection Areas
- National Trails
- Areas of Critical Environmental Concern
- Wild and Scenic Rivers

The various special designation areas within GRSG habitat in the planning are shown in **Table 3-47**, Special Designations[1] within Greater Sage-Grouse Habitat in the Planning Area. These include BLM ACECs, USFWS National Wildlife Refuges, national conservation easements, National Park System units, BLM National Landscape Conservation System units, conservation areas on private and state land, and congressionally designated Wilderness areas.

Table 3-47
Special Designations[1] within Greater Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres[1]	Acres within PGH	Acres within PPH
BLM	IV	963,000	486,400	476,600
	V	1,460,800	881,800	579,000
Forest Service	IV	0	0	0
	V	0	0	0
Tribal and Other Federal	IV	23,000	14,800	8,200
	V	298,400	51,000	247,400
Private	IV	5,200	1,500	3,700
	V	19,200	13,200	6,000
State	IV	300	100	200
	V	100	0	100
Other	IV	0	0	0
	V	0	0	0

Source: Manier et al. 2013
[1]Includes BLM ACECs, USFWS National Wildlife Refuges, national conservation easements, National Park System units, BLM National Landscape Conservation System units, conservation areas on private and state land, and congressionally designated Wilderness areas.

3.15.1 Wilderness Areas

The FLPMA identifies wilderness values as part of the spectrum of public land resource values and uses to be considered in the BLM's planning, inventory, and management activities. A BLM Wilderness Area is an area of public lands that Congress has designated for the BLM to manage as a component of the National Wilderness Preservation System in accordance with the Wilderness Act of 1964.

Subject to valid existing rights and special provisions, the BLM administers Wilderness Areas within the National Wilderness Preservation System in accordance with the Wilderness Act of 1964; BLM Wilderness Regulations (43 CFR 6300); and BLM Manual Section 6340, Management of Designated Wilderness Areas (BLM 2012p); the specific directives of their enabling legislation (e.g., the Steens Mountain Cooperative Management and Protection Act, the Omnibus Public Lands Act of 2000); and Appendix A of the Committee on Interior and Insular Affairs of the House of Representatives accompanying H.R. 2570 of the 101st Congress (commonly called the Congressional Wilderness Grazing Guidelines). In addition, the BLM, USFWS, Forest Service, and National Park Service, have adopted use of the Minimum Requirements Decision Guide (Arthur Carhart National Wilderness Training Center 2011) for all project proposals within wilderness areas.

Existing Conditions

The BLM manages three Wilderness Areas consisting of approximately 200,400 acres within the planning area. Both wilderness areas contain GRSG habitat

(**Figure 3-9**, Special Designations in the Planning Area, and **Table 3-48**, Wilderness Areas in the Planning Area with PPH or PGH). The areas containing habitat are discussed in this section.

Table 3-48
Wilderness Areas in the Planning Area with PPH or PGH

Wilderness Area	District	Acres			
		Non-habitat	PGH	PPH	Total
Hells Canyon Wilderness	Vale	946	0	0	946
Oregon Badlands Wilderness	Prineville	28,153	1,032	0	29,185
Steens Mountain Wilderness	Burns	13,021	112,758	44,445	170,224
Total		42,120	113,790	44,445	200,355

Source: Oregon/Washington BLM 2013

Oregon Badlands Wilderness Area

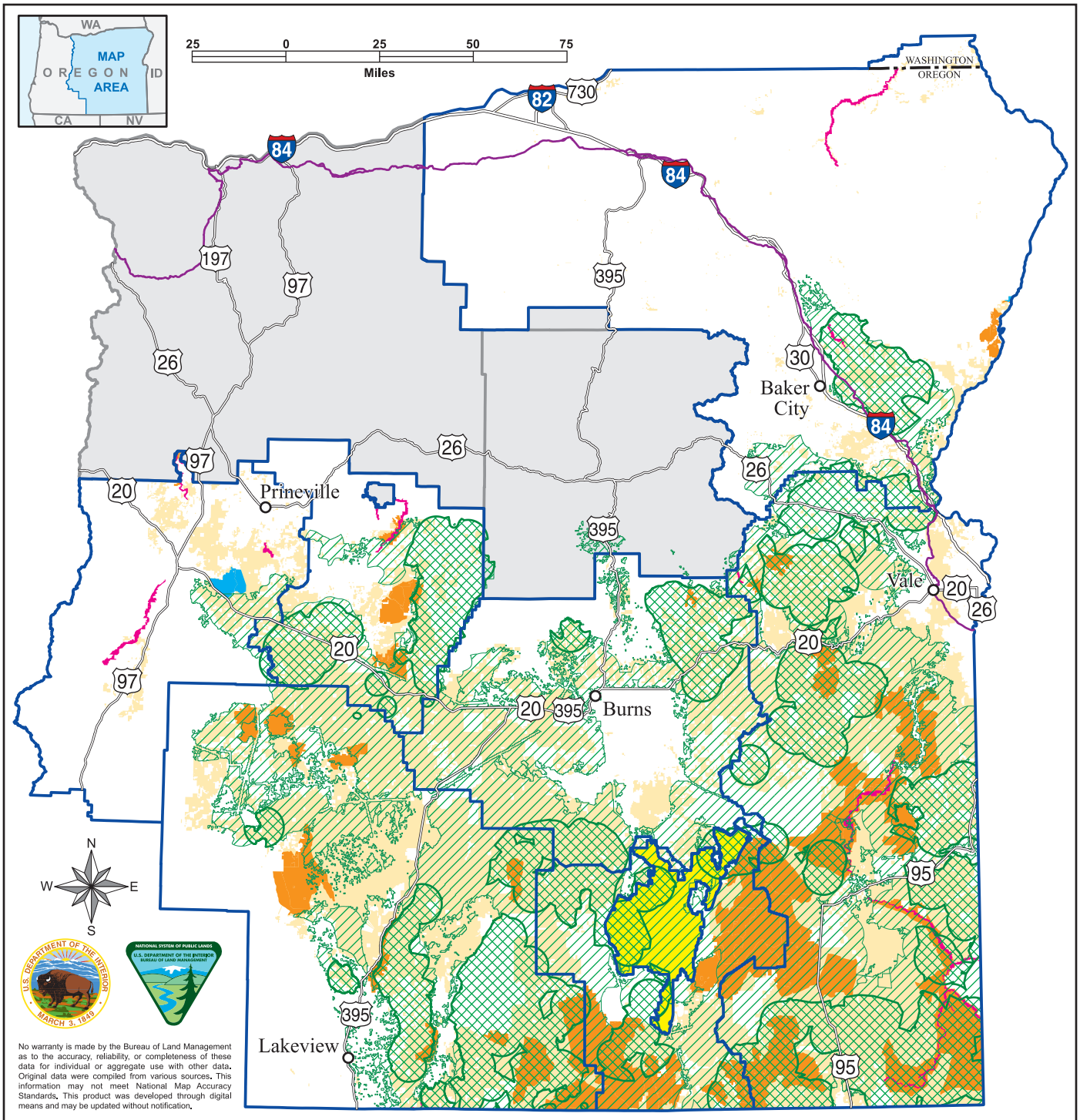
The Omnibus Public Land Management Act of 2009 established the Oregon Badlands Wilderness consisting of 29,185 acres of BLM-administered land. The Oregon Badlands Wilderness is located on terrain associated with a volcanic rootless shield (rootless lava shields are accumulations of lava flows fed from skylights above lava tubes; they are common features at basaltic shield volcanoes). The Oregon Badlands Wilderness contains mature juniper woodlands, unique geologic formations, and primitive recreation opportunities. Approximately 1,000 acres of the Oregon Badlands Wilderness include PGH. The remaining 28,200 acres do not include PPH or PGH.

Steens Mountain Wilderness Area

The Steens Mountain Cooperative Management and Protection Act (Public Law 106-399) established the Steens Mountain Wilderness consisting of approximately 170,200 acres of BLM-administered land. Within the Steens Mountain Wilderness is approximately 95,000 acres of the approximate 97,200-acre No Livestock Grazing Area, which was also designated by the Steens Act. The Steens Mountain Wilderness was the first congressionally designated livestock-free wilderness in the US. Some of the most unique attributes of the Steens Mountain Wilderness are the scenic vistas and spectacular geology. PPH exists within approximately 44,400 acres of the Steens Mountain Wilderness. PGH exists within approximately 112,800 acres of the Steens Mountain Wilderness. Approximately 13,021 acres of the Steens Mountain Wilderness do not fall within PPH or PGH.

Trends

The BLM will continue to manage Wilderness Areas in accordance to Congressional legislation as a component of the National Wilderness Preservation System in accordance with the Wilderness Act of 1964. The wilderness characteristics (untrammeled, natural, undeveloped, outstanding



Legend

- BLM Office
- GRSG RMP Boundary
- Non-GRSG RMP Area

Greater Sage-Grouse Habitat

- Preliminary Priority Habitat
- Preliminary General Habitat

Special Designations

- Oregon National Historic Trail
- Wild and Scenic River Corridor
- Wilderness
- Wilderness Study Area
- Steens Mountain Cooperative Management and Protection Area*
- Other BLM Administered Land

** The Steens CMPA contains areas with additional designations as Wilderness, Wilderness Study Area, and Wild and Scenic River Corridor*

Figure 3-9: Special Designations in the Planning Area

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opportunities for solitude or primitive and unconfined recreation, and unique or supplemental values) within Wilderness Areas would continue.

3.15.2 Wilderness Study Areas

The FLPMA referenced and incorporated the goals and criteria of the Wilderness Act of 1964. As a consequence, the BLM was mandated in 1976 to review public land for possible wilderness designation and to offer recommendations by October 21, 1991, through the Secretary of the Interior, to the President. In November 1980, as part of this review, the BLM in Oregon designated more than 80 Wilderness Study Areas (WSAs). A WSA is a parcel of public land determined through intensive inventories to possess certain characteristics described in the Wilderness Act. Only Congress can ultimately decide which areas, if any, would be designated as Wilderness and added to the National Wilderness Preservation System. Until Congress acts on the recommendations, and either designates them as Wilderness or releases them for other uses, these areas are managed according to BLM Manual 6330, Management of Wilderness Study Areas (BLM 2012c) to preserve their wilderness values. Activities that would impair wilderness suitability are prohibited in WSAs. This nonimpairment standard applies to all uses and activities, except those specifically exempted, as described in BLM Manual 6330, Management of Wilderness Study Areas (BLM 2012c).

Existing Conditions

There are 74 WSAs encompassing over 2.5 million acres in the planning area (**Figure 3-9**, Special Designations in the Planning Area, and **Table 3-49**, Wilderness Study Areas in the Planning Area with PPH or PGH), of which 68 (2,478,200 acres) include PPH and/or PGH. Of these 68 WSAs, approximately 993,800 acres (40 percent) include PPH, and approximately 1,202,900 acres (49 percent) include PGH, for a total of 2,196,700 acres (89 percent) of PPH and PGH.

The remaining six WSAs do not contain PPH or PGH. Therefore, these WSAs are not considered in detail.

Trends

The BLM will continue to manage WSAs in a manner that would not impair the suitability of the area for preservation as wilderness, and to prevent unnecessary or undue degradation. Beyond the exceptions described in BLM Manual 6330, Management of Wilderness Study Areas (BLM 2012c), permitted activities in WSAs are temporary uses that create no new surface disturbance. Thus, the trend for WSAs is the continuing presence of their suitability for preservation as wilderness.

Table 3-49
Wilderness Study Areas in the Planning Area with PPH or PGH

Name	District	Acres		
		Non-habitat	PGH	PPH
Abert Rim	Lakeview	8,513	3,627	12,952
Alvord Desert	Burns/Vale	31,816	204,586	0
Basque Hills	Burns/Lakeview	4,120	81,440	54,755
Beaver Dam Creek	Vale	0	1,103	17,996
Blitzen River	Burns	1	2,045	29,879
Blue Canyon	Vale	173	8,103	4,254
Bowden Hills	Vale	0	59,066	0
Bridge Creek	Burns	0	0	14,326
Camp Creek	Vale	0	0	19,894
Castle Rock	Vale	0	3,367	2,797
Cedar Mountain	Vale	0	31,561	1,897
Clarks Butte	Vale	2,144	19,805	9,385
Cottonwood Creek	Vale	0	0	8,115
Cougar Well	Prineville	4,268	8,967	6,111
Devils Garden Lava Bed	Lakeview	12,742	15,424	0
Diablo Mountain	Lakeview	101,885	16,792	0
Disaster Peak	Burns/Vale	0	0	17,386
Dry Creek	Vale	0	18,441	4,920
Dry Creek Buttes	Vale	5,061	46,264	0
East Alvord	Burns	0	22,153	0
Fifteenmile Creek	Vale	0	268	50,115
Fish Creek Rim	Lakeview	4,377	3,255	11,497
Four Craters Lava Bed	Lakeview	5,782	6,691	0
Gold Creek	Vale	97	424	12,889
Guano Creek	Lakeview	0	0	10,552
Hampton Butte	Prineville	6,847	3,098	303
Hawk Mountain	Burns/Lakeview	275	54,475	15,009
Heath Lake	Burns	1	5,515	15,695
High Steens	Burns	318	13,781	0
Home Creek	Burns	0	1,178	0
Honeycombs	Vale	1,960	36,842	0
Jordan Craters	Vale	15,861	5,115	6,793
Lookout Butte	Vale	1	7,769	58,479
Lost Forest Instant Study Area	Lakeview	428	7,653	0
Lower Owyhee Canyon	Vale	12,277	49,384	3,956
Lower Stonehouse	Burns	2,358	4,902	205
Mahogany Ridge	Burns/Vale	0	545	26,847
Malheur River-Bluebucket	Burns	0	0	5,550
North Fork	Prineville	7,469	3,917	0
Oregon Canyon	Vale	0	21,808	20,291
Orejana Canyon	Lakeview	0	2,558	21,590
Owyhee Breaks	Vale	0	10,072	1,724
Owyhee River Canyon	Vale	345	40,660	130,735

Table 3-49
Wilderness Study Areas in the Planning Area with PPH or PGH

Name	District	Acres		
		Non-habitat	PGH	PPH
Palomino Hills	Vale	5	50,786	3,521
Pueblo Mountains	Burns	2,335	58,821	12,302
Red Mountain	Burns	0	3,113	12,578
Rincon	Burns/Lakeview	0	52,496	56,049
Saddle Butte	Vale	3,531	40,116	42,253
Sage Hen Hills	Lakeview	48	5,003	2,924
Sand Dunes	Lakeview	13,510	1,988	0
Sand Dunes WSA/Lost Forest Instant Study Area	Lakeview	109	854	0
Sheepshead Mountains	Burns/Vale	28	22,101	30,713
Slocum Creek	Vale	99	6,668	768
South Fork Donner Und Blitzen	Burns	29	10,521	17,440
South Fork	Prineville	13,365	1,618	5,345
Spaulding	Lakeview	0	475	67,854
Sperry Creek	Vale	0	2,324	2,982
Squaw Ridge Lava Bed	Lakeview	17,841	10,831	0
Stonehouse	Burns	3	417	22,360
Table Mountain	Burns/Vale	0	39,884	187
Twelvemile Creek	Vale	0	0	28,142
Upper Leslie Gulch	Vale	0	2,812	101
Upper West Little Owyhee	Vale	0	0	61,536
West Peak	Burns	0	8,597	0
Wild Horse Basin	Vale	1,477	10,505	0
Wildcat Canyon	Burns/Vale	0	34,767	0
Willow Creek	Burns/Vale	0	0	29,869
Winter Range	Burns	0	15,510	0
Total		**281,499**	**1,202,861**	**993,821**

Source: Oregon/Washington BLM 2013

3.15.3 Cooperative Management and Protection Areas

The Steens Mountain Cooperative Management and Protection Act (Public Law 106-399) established the Steens Mountain Cooperative Management and Protection Area encompassing approximately 428,200 acres of BLM-administered land in the BLM Burns District. The area offers diverse scenic and recreational experiences. It encompasses a landscape with deep glacier-carved gorges, stunning scenery, wilderness, wild rivers, and a rich diversity of plant and animal species. The Steens Mountain Cooperative Management and Protection Area (428,200 acres) is entirely within the Burns District and entirely within the planning area. The BLM manages the Steens Mountain Cooperative Management and Protection Area in accordance with the direction provided in BLM Manual 6220, National Monuments, National Conservation Areas, and Similar Designations (BLM 2012t).

3.15.4 National Trails

The Oregon National Historic Trail is a 2,000-mile historic east-west large-wheeled wagon route and emigrant trail that connected the Missouri River to valleys in Oregon. A total of 279 miles of the trail occur in the planning area, 28 miles of which traverse BLM-administered lands. Of the 28 miles on BLM-administered land, 4 miles are in PPH, 1 mile is in PGH, and 23 miles are in non-habitat.

The BLM manages National Historic Trail resources, qualities, values, and associated settings, and the primary use or uses in accordance with the direction provided in BLM Manual 6280, Management of National Scenic and Historic Trails and Trails under Study or Recommended as Suitable for Congressional Designation (BLM 2012s).

3.15.5 Areas of Critical Environmental Concern

Areas of Critical Environmental Concern (ACECs) are defined in the FLPMA, 43 USC 1702(a), and 43 CFR 1601.0-5(a) as "areas within the public lands where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish, wildlife and botanical resources or other natural systems or processes, or to protect life and safety from natural hazards." The intent of Congress in mandating the designation of ACECs was to give priority to the designation and protection of areas containing unique and significant resource values. ACECs, including Research Natural Areas (RNA) and Outstanding Natural Areas, are areas on BLM-administered lands where special management attention is required to protect or to prevent irreparable damage to relevant values. These values identified in the ACEC nomination process must meet a set of importance criteria (BLM 1988). The value, resource, process or natural system, or hazard present must have one of more of the following:

- More than locally significant qualities which give it special worth, consequence, meaning, distinctiveness, or cause for concern
- Qualities or circumstances that that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, endangered, threatened, or vulnerable to adverse change
- Recognition as warranting protection in order to satisfy national priority concerns or to carry out mandates of FLPMA
- Qualities that warrant highlighting in order to satisfy public or management concerns about safety and public welfare
- Qualities that pose a significant threat to human life and safety or to property

An ACEC must also require special management attention to protect the identified relevant and important values. Special management attention refers to management prescriptions that are developed during preparation of an RMP or

RMP amendment expressly to protect relevant and important values of an area from the potential effects of actions permitted by the RMP. These are management measures that would not be necessary and prescribed if the critical and important features were not present (FLPMA 1976; BLM 1988).

RNAs are a unique type of ACEC created to preserve examples of all significant natural ecosystems for comparison with those influenced by man; provide educational and non-destructive research for ecological and environmental studies; and preserve gene pools of typical and endangered plants and animals. RNAs are areas that are part of a national network of reserved areas under various ownerships that contain important ecological and scientific values and are managed for minimum human disturbance. RNAs are intended to represent the full array of North American ecosystems with their biological communities, habitats, natural phenomena, and geological and hydrological formations. In RNAs, natural processes are allowed to predominate and are primarily used for non-manipulative research and baseline data gathering on relatively unaltered plant community types. Under certain circumstances, deliberate manipulation may be used to maintain the unique features for which the RNA was established. Because natural processes are allowed to dominate, RNAs also make excellent controls for similar communities that are being actively managed, and for long-term monitoring for climate change. In addition, RNAs provide an essential network of diverse habitat types that will be preserved in their natural state for future generations.

RNAs have important biological or physical attributes that are identified and designated in cooperation with the Pacific Northwest RNA Committee (Forest Service, BLM, and Washington and Oregon States) following the Oregon Natural Areas plan (Oregon Natural Heritage Advisory Council 2010). One of the guiding principles in management of RNAs is to prevent unnatural encroachments or activities that directly or indirectly modify ecological processes or conditions. Permitted activities that could impair scientific or education values of the RNAs (e.g., energy development, logging, road building, livestock grazing, and recreation use) are generally limited, restricted, or not allowed so to provide areas within the RNA that have intact ecological conditions and processes. These areas can be used for long-term baseline plant community monitoring; areas where few management activities have influenced the plant community for which the RNA was established. Management practices necessary to maintain or restore ecosystems can be allowed, and perhaps necessary to maintain the values, especially invasive weed control.

Existing Conditions

Within the planning area there are 92 ACECs on 715,000 acres. There are 76 ACECs and RNAs (83 percent) with some acres in PPH (200,400 acres, or 28 percent) or PGH (251,200 acres, or 35 percent); these ACECs with some acres in PPH or PGH are shown in **Table 3-50**, ACECs in the Planning Area with PGH or PPH. There are 16 ACECs that provide no GRSG habitat. Thirty

Table 3-50
ACECs in the Planning Area with PGH or PPH

ACEC	Type	District	Acres		
			Non-habitat	PGH	PPH
Abert Rim	ACEC	Lakeview	2,889	3,172	11,977
Alvord Desert	ACEC	Burns	2,244	19,383	0
Benjamin	RNA	Prineville	0	637	0
Big Alvord Creek	RNA	Burns	0	1,677	0
Biscuitroot	ACEC	Burns	0	911	5,613
Black Canyon	RNA	Vale	0	1,080	1,561
Black Hills	RNA	Lakeview	0	3,048	0
Borax Lake	ACEC	Burns	503	97	0
Castle Rock	ACEC	Vale	0	12,208	10,654
Coal Mine Basin	RNA	Vale	0	0	756
Connley Hills	RNA	Lakeview	2,238	1,362	0
Devils Garden Lava Beds	ACEC	Lakeview	12,803	15,440	0
Diamond Craters	ONA	Burns	14,187	2,847	0
Dry Creek Bench	RNA	Vale	0	0	1,637
Dry Creek Gorge	ACEC	Vale	0	12,209	3,833
Dry Mountain	RNA	Burns	1,113	1,017	0
East Fork Trout Creek	RNA	Burns	0	0	361
East Kiger Plateau	RNA	Burns	309	907	0
Fir Groves	ACEC	Burns		172	307
Fish Creek Rim	RNA	Lakeview	1,592	1,241	5,885
Foley Lake	RNA	Lakeview	0	0	2,228
Foster Flat	RNA	Burns	0	0	2,686
Guano Creek-Sink Lakes	RNA	Lakeview	0	0	11,185
Hammond Hill Sand Hills	RNA	Vale	0	3,716	0
Hawksie-Walksie	RNA	Lakeview	107	13,434	3,766
High Lakes	ACEC	Lakeview	0	0	38,942
Honeycombs	RNA	Vale	1,610	14,258	0
Horse Ridge	RNA	Prineville	0	609	0
Jordan Craters	RNA	Vale	16,039	5,452	9,868
Juniper Mountain	RNA	Lakeview	0	6,330	0
Keating Riparian	ACEC	Vale	320	682	1,172
Keating Riparian	RNA	Vale	0	0	51
Kiger Mustang	ACEC	Burns	1,525	26,288	27,776
Lake Abert	ACEC	Lakeview	47,304	1,764	980
Lake Ridge	RNA	Vale	0	0	3,860
Leslie Gulch	ACEC	Vale	177	11,505	0
Little Blitzen	RNA	Burns	0	2,255	0
Little Whitehorse Creek	RNA	Vale	0	0	61
Little Wildhorse Lake	RNA	Burns	0	241	0
Long Draw	RNA	Burns	0	441	0
Lost Forest	RNA	Lakeview	537	8,385	0

Table 3-50
ACECs in the Planning Area with PGH or PPH

ACEC	Type	District	Acres		
			Non-habitat	PGH	PPH
Lost Forest-Sand Dunes-Fossil Lake	ACEC	Lakeview	19,256	7,480	0
Mahogany Ridge	RNA	Vale	0	136	545
Mendi Gore Playa	RNA	Vale	0	149	0
Mickey Basin	RNA	Burns	0	560	0
Mickey Hot Springs	ACEC	Burns	0	42	0
North Fork Crooked River	ACEC	Prineville	5,884	784	0
North Fork Malhuer River	ACEC	Prineville/Vale	0	1,199	614
North Ridge Bully Creek	RNA	Vale	0	0	1,569
Oregon Trail	ACEC	Vale	433	264	1206
Oregon Trail, Birch Creek	ACEC	Vale	79	0	41
Oregon Trail, Tub Mountain	ACEC	Vale	5,765	0	145
Owyhee Below Dam	ACEC	Vale	6,262	4,748	0
Owyhee Views	ACEC	Vale	9,709	42,620	176
Palomino Playa	RNA	Vale	0	47	599
Powder River	ACEC	Vale	0	0	5,909
Pueblo Foothills	RNA	Burns	0	2,424	0
Rahilly-Gravelly	RNA	Lakeview	65	476	18,139
Red Knoll	ACEC	Lakeview	10	809	10,302
Rooster Comb	RNA	Burns	0	683	0
Saddle Butte	ACEC	Vale	55	1,725	5,316
Serrano Point	RNA	Burns	153	527	0
Silver Creek	RNA	Burns	541	1,393	0
South Bull Canyon	RNA	Vale	0	0	790
South Fork Crooked River	ACEC	Prineville	2,989	660	3
South Fork Willow Creek	RNA	Burns	0	186	0
South Ridge Bully Creek	RNA	Vale	0	0	621
Spanish Lake	RNA	Lakeview	162	566	3,978
Spring Mountain	RNA	Vale	0	0	996
Stockade Mountain	RNA	Vale	0	1,768	0
Table Rock	ACEC	Lakeview	399	4,740	0
Toppin Creek Butte	RNA	Vale	0	0	3,998
Tumtum Lake	RNA	Burns	1,151	539	0
Unity Reservoir Bald Eagle Nest	ACEC	Vale	347	9	0
Warner Wetlands	ACEC	Lakeview	48,034	3,888	0
Winter Roost	ACEC	Prineville	0	41	295
Total			**206,791**	**251,231**	**200,401**

Source: Oregon/Washington BLM 2013

ACECs and RNAs (33 percent of total ACECs) are primarily within PPH. There are 2 ACECs and 14 RNAs (16 percent of total ACECs) occupying 75,648 acres of GRSG habitat that are wholly within PPH. There are 11 ACECs in PPH or PGH that have active or recently occupied GRSG leks, namely Albert Rim ACEC, Devils Garden Lava Beds ACEC, Guano Creek-Sink Lakes RNA, High Lakes ACEC, Kiger Mustang ACEC, North Ridge Bully Creek RNA, Powder River ACEC, Rahilly-Gravelly RNA, Red Knoll ACEC, South Ridge Bully Creek RNA, and Toppin Creek Butte RNA. There are seven ACECs in PPH or PGH where the relevant and important values for which the ACEC was designated include GRSG: High Lakes ACEC, Lake Ridge RNA, North Ridge Bully Creek RNA, Rahilly-Gravelly RNA, Red Knoll ACEC, South Ridge Bully Creek RNA, and Toppin Creek Butte RNA. Although GRSG was a value for which only seven of the existing ACECs or RNAs in PPH or PGH were designated, many of them likely provide high-quality GRSG habitat and may contain GRSG leks. The RNAs that contain PPH could serve as future areas to provide baseline monitoring for sagebrush communities, and as areas to document the changes in the plant communities due to climate change without major influences from management activities.

Trends

Numerous ACECs and RNAs have value for the conservation of GRSG. Nearly 30 percent of the total acres fall within PPH and likely contain sagebrush habitats important for GRSG conservation, even though few (7 of 76) of these areas were specifically designated for GRSG as a value. The exact trends for ACECs and RNAs are mostly unknown. Little or no formal monitoring of the values for ACECs or the plant community cells for RNAs has occurred within the planning area. It is assumed that for ACECs, BLM actions do not detract from the values that the ACECs were designated for, and that these areas will be afforded protection following policy; therefore, it is assumed that the values are being maintained.

3.15.6 Wild and Scenic Rivers

Wild and scenic rivers are rivers or river sections designated by Congress under the authority of the Wild and Scenic Rivers Act of 1968 (Public Law 90-542, as amended; 16 USC 1271-1287) for the purpose of preserving rivers or river sections in their free-flowing condition, preserving water quality, and protecting outstandingly remarkable values (ORVs) and tentative classification. River segment ORVs are identified on a segment-specific basis and may include scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. The Wild and Scenic Rivers Act defines a river as "a flowing body of water or estuary or a section, portion, or tributary thereof, including rivers, creeks, runs, kills, rills, and small lakes." The Act also defines free-flowing as "existing or flowing in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway. The existence, however, of low dams, diversion works, and other minor structures at the time any river is proposed for inclusion ... shall not automatically bar its consideration

for such inclusion." The ORVs listed in the Act are scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values.

Existing Conditions

Within the planning area there are 23 WSRs on approximately 75,300 acres of BLM-administered lands. Of these, approximately 22,600 acres (30 percent) fall within PPH, and approximately 38,500 acres (51 percent) fall within PGH (**Figure 3-9**, Special Designations in the Planning Area, and **Table 3-51**, Wild and Scenic Rivers in the Planning Area with PPH or PGH). The Donner und Blitzen, Kiger Creek, and Wildhorse WSR corridors are all within the Steens Mountain CMPA.

The Grande Ronde River, Lower Crooked River, Middle Deschutes River, Upper Deschutes River, and Wallowa WSRs are within the planning area but do not have PPH or PGH within the WSR corridors. Therefore, these WSRs are not considered in detail.

Table 3-51
Wild and Scenic Rivers in the Planning Area with PPH or PGH

River Segment	District	Classification	Acres		
			Non-habitat	PGH	PPH
Donner und Blitzen-Ankle Creek	Burns	Wild	0	1,656	0
Donner und Blitzen-Fish Creek	Burns	Wild	1	1,089	147
Donner und Blitzen-Indian and Big Indian Creek	Burns	Wild	5	5,162	0
Donner und Blitzen-Little Blitzen River	Burns	Wild	5	6,051	152
Donner und Blitzen-Little Indian Creek	Burns	Wild	3	1,360	0
Donner und Blitzen-Main Stem	Burns	Wild	0	0	2,541
Donner und Blitzen-Mud Creek	Burns	Wild	0	1,515	0
Donner und Blitzen-South Fork	Burns	Wild	3	2,063	666
Donner und Blitzen-South Fork of Ankle Creek	Burns	Wild	0	476	0

Table 3-51
Wild and Scenic Rivers in the Planning Area with PPH or PGH

River Segment	District	Classification	Acres		
			Non-habitat	PGH	PPH
Kiger Creek	Burns	Wild	130	1,291	0
Main Owyhee River	Vale	Wild	1,326	10,645	4,522
North Fork Crooked River	Prineville	Recreational/ Scenic/Wild	3,266	734	0
North Fork Malheur River	Vale	Scenic	0	650	347
North Fork Owyhee River	Vale	Wild	0	932	762
Powder River	Vale	Scenic	0	0	2,511
West Little Owyhee River	Vale	Wild	0	1,854	10,929
Wildhorse-Little Wildhorse Creek	Burns	Wild	0	922	0
Wildhorse-Wildhorse Creek	Burns	Wild	0	2,097	0
Total			**4,739**	**38,497**	**22,577**

Source: Oregon/Washington BLM 2013

Trends

The BLM will continue to manage WSRs to preserve and protect their free-flowing nature and ORVs. Thus, the trend for WSRs is sustaining and protecting their ORVs.

3.16 SOIL RESOURCES

Soil processes determine, to a large extent, the structure and function of ecosystems. Soil health is integral to the BLM's mandate to sustain the health, diversity, and productivity of BLM-administered lands. The existing RMPs vary in the level of content and detail given to various soil resource topics, including desired outcomes for soil conditions, watersheds or specific soils that may need special protection, riparian areas, and use restrictions or other protective measures.

Soil type and quality, along with climate, determine whether sagebrush can grow in a given location, and can determine the type or variety of sagebrush community that is able to thrive. Among other factors, the presence of GRSG is dependent upon the presence of sagebrush. Due to sagebrush type and viability being dependent on soil type and quality, soils are an important element of GRSG habitat.

3.16.1 Existing Conditions

The NRCS provides soil mapping for individual counties across the United States. The major exception to this for the planning area is Malheur County in the southeast corner of Oregon, because NRCS soil data is currently being obtained through long term inventory and mapping work.

Conditions of the Planning Area

Soil Productivity

Soil productivity within the planning area varies widely due to the diversity of soils and site characteristics, specifically differences in elevation and slope gradient. The soil types in the planning area occur from approximately 2,000 to 9,700 feet above mean sea level. The planning area landscape varies greatly, from broad valleys to mountains.

Some of the most productive soils are found in well drained valley bottoms, toe-slopes, benches, and broad ridge tops. On uplands where rainfall is moderate to low, medium-textured soils may produce favorable conditions, depending on land uses such as livestock grazing. Soils that feature shallow claypans, hardpans, or salts are less productive and pose substantial constraints to land use and management.

When soil productivity is degraded in semi-arid high desert regions, natural processes are slow to return site productivity. Prevention of soil degradation is more cost-effective and time-effective than remediation or waiting for natural processes. Management practices (such as proper stocking rates for livestock, rotation of grazing, periodic rest from grazing, improved site design, proper construction and maintenance of roads, selective logging, rehabilitation of unnecessary surface disturbance, restricting vehicles to roads and trails, rehabilitating mined areas, and control of concentrated recreational activities) have reduced erosion effects and improved soil conditions.

Soil Erosion

Factors that influence erosion of soil include soil texture, soil structure, length and percent of slope, vegetative cover, and rainfall or wind intensity. Soils most susceptible to erosion by wind or water are typified by bare or sparse vegetative cover, non-cohesive soil particles with low infiltration rates, and moderate to steep slopes. Wind erosion processes are less affected by slope angles, but are highly influenced by wind intensity. Soils are prone to degradation when soil is removed by erosion in excess of the ability for soil to be rebuilt.

Wind erosion is particularly a hazard when surface disturbance, biological crusts, and vegetation are removed, especially after fire or other disturbances. Because of the semi-arid conditions found in the planning area, soil texture and wind speed are important factors affecting erosion of soil by wind. The overall majority of the planning area is considered to be of slight risk for wind erosion.

In general, the area between La Pine and Burns contains concentrations of lands that are most susceptible to wind erosion. Also, the area between Lakeview and Highway 95 has scattered lands that are most susceptible to wind erosion (Oregon/Washington BLM 2013).

The semi-arid planning area also allows for soil to erode naturally during infrequent rain events. The risk to erosion by water is slight, except in those very steep canyons and exposed bedrock ridges that have a severe to very severe rating from the county soil survey data. The potential for erosion increases with increasing slope. Due to the lack of data for Malhuer County, it is difficult to define the extent of those acres that exceed 35 percent slope within PPH and PGH in the planning area. However from the available counties it can be noted that there is a concentrated area mostly in the Burns and Lakeview Districts (Oregon/Washington BLM 2013). Steep slopes are concentrated in the areas where uplifted faults are exposed above the soil surface plane within the planning area.

NRCS soil map unit descriptions rate soils in the planning area according to their susceptibility to water and wind erosion. Soils in the planning area were screened based on several relevant characteristics that indicate potentially fragile soils or high erosion hazards. These characteristics include the following:

- Soils rated as highly or severely erodible by wind or water, as described in NRCS soil survey reports
- Soils on slopes greater than 35 percent

Based on current soil survey data, the most fragile or highly erodible soils occur in areas of the Burns and Lakeview Districts within the planning area. Malheur County in the Vale District will likely contain additional similar fragile or highly erodible soils as well, because it has a similar geomorphic origin.

Management actions also affect the rate at which soil erodes, because they influence the types of surface disturbing activities that occur. Surface-disturbing actions that remove vegetative cover increase the erosion rate. Some soils, such as shallow soils over bedrock, are particularly vulnerable to soil erosion.

Soil Types

Third-order soil surveys, provided by the NRCS, cover most of the planning area. The NRCS maps over 12,300 soil map units in the planning area, making summarization complex (NRCS 2012).

Soil can be classified in many ways according to a variety of parameters. For the generalization of soils in the planning area, the taxonomy of soil order is a convenient starting place. For the planning area, the largest soil order is the Mollisols. This order encompasses approximately 71 percent of the GRSG core habitat acres. The Aridisols correspond to 19 percent of the area and the

Alfisols correspond to 4 percent. The remaining areas are composed of similar young developmental soils in the Inceptisol, Entisol, Andisol orders with a very small amount of Histisols and Vertisols (Soil Survey Staff 2012).

The NRCS provides a suite of risk ratings, interpretations, and basic soil data that describes soil resources. The soil texture for most soils across the planning area is a loam as composed of the representative percent of sand, silt and clay. Some greater or lesser amounts of these percentages produce clayey loams and silty loams for the most part. The soils have very low amounts of organic matter (2 percent), low available moisture in the top 10 inches (3.3 inches) and are considered well drained.

When it comes to infiltration of water into the soil surfaces, these soils will take in water well. The silty and clay nature of the soil causes them to percolate water more slowly than sandy soil or rocky soil. But for most of the planning area, percolation rates do not cause standing water to form. The majority of the soils (71 percent) convey water at rates greater than 6 micrometers/second or about 1 inch per hour. Of particular note are those soils in the low wetland areas and in the northwest part of the planning area. They allow infiltration to equal or exceed 2 inches per hour. This is correlated to those same soils that have the highest wind erosion rates across the planning area. Others within the planning area have a very low rate of loss per acre and, therefore, are at low risk to wind erosion (Oregon/Washington BLM 2013).

Hydric (wet) soils, unique biological soil crusts, and prime agriculture land are special soil types in the planning area. Hydric soils or partially hydric soils constitute 27 percent of the planning area (Oregon/Washington BLM 2013). Hydric soils are associated with riparian areas. Riparian-wetland soils are found throughout the planning area along water courses, near springs, seeps, playas, and adjacent to reservoirs. Because of the presence of water, riparian-wetlands have soil properties that differ from upland areas. For example, most upland soils are derived from in-place weathering processes and relatively little soil is derived from offsite sources. In contrast, riparian-wetland soils are constantly changing because of the influx of new material being deposited by different storm events and overland flow. As a result, great variability in soil types can occur over short distances (BLM 2003b). An inventory of these soils has not been completed. Due to the dynamic nature of these soils, they require intensive monitoring and management.

Biologic soil crusts are made up of tiny living plants and bacteria that grow together on the soil surface. They help keep the soil from washing or blowing away, fix nitrogen from the atmosphere into the soil, help keep out weeds, and promote the health of plant communities. In areas where biologic soil crusts have been lost, there is a greater risk of annual grass (or other invasive) invasion than in areas with intact crusts. Biologic soil crusts are found throughout the planning area.

Prime farmland has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. It must also be available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, water management, and tillage. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding. NRCS rated soils for prime farmland in PPH and PGH covers 8,573,864 acres. Acres of cropland in PPH and PGH are identified in **Table 3-52**, Acres of Cropland within Sage-Grouse Habitat in the Planning Area, below. There are fewer acres in the table below, because the table displays the number of acres currently growing crops, instead of the number of acres capable of growing crops with irrigation or with irrigation and drainage developed.

Table 3-52
Acres of Cropland within Sage-Grouse Habitat in the Planning Area

Surface Management Agency	Management Zone	Total Acres[1]	Acres within PGH	Acres within PPH
BLM	IV	500	300	200
	V	500	400	100
Forest Service	IV	0	0	0
	V	0	0	0
Tribal and Other Federal	IV	100	100	0
	V	300	300	0
Private	IV	26,700	18,600	8,100
	V	57,600	54,800	2,800
State	IV	100	100	0
	V	400	400	0
Other	IV	0	0	0
	V	0	0	0
Total		**86,200**	**75,000**	**11,200**

Source: Manier et al. 2013
[1]Based on data provided by the National Agricultural Statistics Service

3.16.2 Trends

Soil resources change slowly unless catastrophic or larger scale disturbance events, such as landslides, floods, volcanoes or wildfires, occur. Then, erosion or deposition would change the ground cover at one point or many. Thus, the degree of change in the planning area would be considered low or insignificant, with the direction of change being that most likely to occur naturally over time. There have been larger wildfire events and, to some degree, restoration activities that have altered the vegetation communities where juniper has been

invading sagebrush communities. These activities alter the hydrologic condition of the soil and provide support for recovery of disturbance over time.

The overall trend for soil resources is to maintain or improve the ability of the soil to support native vegetation and allow water and nutrients to be cycled by either macro- or microorganisms, all of which promote and improve the health of the land. Degradation by excessive grazing, erosion, or land developments will cause a reduction in soil function, as one or perhaps many of the soil properties are changed, thereby affecting the functions necessary for healthy soil.

In the planning area, impacts on soil resources have resulted from energy development, improper grazing, recreation, natural processes, and other activities. The potential for maintaining or restoring these communities and conserving the soil resource depends on the specific soil types and how resource programs are managed.

3.17 WATER RESOURCES

Water on BLM-administered lands is regulated by the Clean Water Act, Safe Drinking Water Act, Public Land Health Standards, and other laws, regulations, and policy guidance at the federal, state, and local levels. Water resources in Oregon are legally administered through the Oregon Administrative Rules.

The Oregon Department of Environmental Quality (ODEQ) has granted designated management agency status to the BLM. As a designated management agency, the BLM must implement and enforce natural resource management programs for the protection of water quality on federal lands under its jurisdiction; protect and maintain water quality where it meets or exceeds applicable state and tribal water standards; monitor activities to assure that they meet standards and report the results to the State of Oregon; and meet periodically to recertify water quality best management practices (BMPs). BMPs include methods, measures, or practices to prevent or reduce water pollution, including but not limited to structural and nonstructural controls, operations, and maintenance procedures. BMPs are applied as needed to projects.

In Oregon, all water is publicly owned and falls under the management jurisdiction of the State of Oregon. Permits for water use from any source must be obtained from the Oregon Water Resources Department, with some exceptions (e.g., federal water rights). Laws pertaining to the use of surface water and groundwater are based on the principle of prior appropriation (first in time, first in right) and limited to the quantity of water needed to satisfy the specified use without waste. That is, the first person to obtain a water right will be the senior holder on a particular stream and has priority over all junior claims in times of water shortage.

3.17.1 Existing Conditions

The discussion of existing conditions includes a description of water resources for the planning area, regardless of land ownership. Where appropriate, it also includes a more detailed description of water resources for just BLM-administered lands within the planning area. For this, the description is limited to describing water resources associated with GRSG and their habitat. Wetlands and livestock water developments are important sources of water that influence GRSG and their habitat.

Conditions of the Planning Area

The BLM is the overwhelming land manager in the planning area. The Forest Service, USFWS, Bureau of Indian Affairs, and the State of Oregon all have lands within the planning area that also contain a suite of water resources.

The yearly precipitation for this area east of the Cascades ranges from 8 to 50 inches, with 19 inches being the average according to annual precipitation data. The northeast corner of the state has the higher average due to increased elevation. Similarly there are areas in the Burns and Lakeview Districts that have greater than average precipitations where rapid changes in elevation exist in those areas (Oregon/Washington BLM 2013).

Within the planning area, the major water features are springs, streams, lakes, wetlands, playas, and dry lakes. Streams can be ephemeral, intermittent, or perennial. Ephemeral streams do not flow during an average water year but do flow in response to large precipitation events. Intermittent streams flow during spring runoff for an average water year but generally dry up later in the summer. Perennial streams contain some water all year for an average water year. Lakes can be permanent or temporary. Wetlands and floodplains vary in extent and depth throughout the year. Permanent waters can also be in the form of ponds and reservoirs developed for human or livestock consumption.

Stream channels and floodplains are important because their shape and condition affect how rapidly water flows through a river system, how much water is stored within the basins, the quality of the water, and how much erosion occurs. These functions, in turn, affect fish and wildlife habitat, agriculture, recreation, and the susceptibility of local communities and landowners to floods.

Surface Water

Stream flow in the planning area is regulated by the State of Oregon. Projects for irrigation, livestock, human use, and flood control are considered beneficial uses but may have significantly altered natural flow regimes. This may in turn have changed habitat conditions, channel stability, and timing of sediment and organic-material transport. Stream flow can be altered by management activities, such as water impoundments, water withdrawal, road construction, vegetation manipulation, grazing, fire suppression, and timber harvesting. All of these activities are currently and historically occur in the planning area.

Most surface runoff in the planning area is from snowmelt in the spring and early summer or rainfall at the higher elevations. Runoff at these times produces peak stream discharges. Many of the streams in the lower-elevation semi-arid areas are either intermittent, with segments of perennial flow near springs, or ephemeral, with flow only during spring runoff and intense summer storms. There are approximately 18,791 perennial and 66,116 intermittent miles of streams in the fourth field watersheds that contain some amount of habitat in the planning area. There are 5,216 perennial and 42,804 intermittent miles of stream miles in PPH and PGH (Oregon/Washington BLM 2013). .

Water developments are also influential sources of water for GRSG. Water developments can function for multiple uses. They provide additional and alternative sources of water for wildlife and livestock, and can decrease use of riparian areas. Within the planning area, the BLM maintains an unknown number of water developments.

GRSG will use free water although they do not require it since they obtain their water needs from the food they eat. Information on the extent of habitat influenced by produced water and the net effects on GRSG populations is unknown (USFWS 2010a). Natural water bodies and reservoirs can provide mesic areas for succulent forb and insect production, thereby attracting GRSG hens with broods (Connelly et al. 2004). It is unknown whether wildlife guzzlers built to supply free water in normally arid habitats provide a net benefit to GRSG or if potential benefits are countered by potential negative consequences. These negative consequences may include increased competition from other species that benefit from guzzlers, such as domestic and wild ungulates, or predators and the associated increase in predation risk (Braun 1998). In addition, new water resources may become additional habitat for mosquitoes carrying West Nile Virus (Naugle 2004).Diverting the water sources has the secondary effect of changing the habitat present at the water source before diversion. This could result in the loss of either riparian or wet meadow habitat important to GRSG as sources of forbs or insects. Further study is needed to determine the effects of water management on the sagebrush biome.

Riparian Areas and Wetlands

Riparian areas are ecosystems that occur along rivers, streams, or water bodies. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Typical riparian areas are lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers, streams, and shores of lakes and reservoirs with stable water levels. Excluded are such sites as ephemeral streams or washes that do not exhibit vegetation dependent on free water in the soil. Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support and which, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include marshes, swamps, lakeshores, sloughs, bogs, wet

meadows, estuaries, and riparian areas. Even though wetlands areas occupy only a small percentage of the planning area land (approximately 2.1 percent), these areas provide a wide range of functions critical to many different wildlife species, improve water quality, provide scenery, and provide recreational opportunities (Oregon/Washington BLM 2013). Additional uncalculated acres of functioning riparian areas would be adjacent to all intermittent and perennial streams across the planning area.

The BLM uses proper functioning condition (PFC) assessments for evaluating riparian-wetland areas and uses it to supplement existing stream channel and riparian area evaluations and assessments. Each riparian-wetland area has to be judged against its capability and potential. The capability and potential of natural riparian-wetland areas are characterized by the interaction of hydrology, vegetation, and erosion/deposition (soils). PFC is defined separately for lotic (moving water systems, such as rivers, streams, and springs) and lentic (standing water systems, such as lakes, ponds, seeps, bogs, and meadows) waters. If a riparian or wetland area is not in PFC, it is placed into one of three other categories: functional, at risk, nonfunctional, or unknown (BLM 1998, 2003b). The data for describing the planning area using PFC assessments is not sufficient to provide an accurate representation of the riparian environment, because the data is lacking for the greater proportion of the analysis area, predominately the Vale District. In addition, the use of PFC between districts was not well coordinated and the interpretations cannot be generalized over this large planning area.

Water Quality

Water quality, as defined by the Clean Water Act, includes all the physical, biological, and chemical characteristics which affect existing and designated beneficial uses. The State of Oregon is required to identify which beneficial uses a water body currently supports or could support in the future. Water quality standards are established to protect the beneficial uses of the State's waters. Beneficial uses of waters are identified in the Oregon Administrative Rules for specific waters. Beneficial uses in the planning area are public and private domestic water supplies, industrial water supply, irrigation, livestock watering, fish and aquatic life, wildlife and hunting, fishing, boating, water contact recreation, and aesthetic quality.

The State of Oregon is required by Section 303(d) of the Clean Water Act to identify waters which are water quality impaired because of failing to meet their designated beneficial uses. Section 303(d) requires that each state develop a list of water bodies that fail to meet water quality standards and delineate stream segments and listing criteria for all streams. The 303(d) list of impaired waters is updated biannually, and the State is required to develop a total maximum daily load allocation for each pollutant of concern.

Water quality is evaluated based on the ability of a water body to support beneficial uses of the water. Generally, key water qualities are those that support native fish and wildlife and support human uses such as agriculture, recreation, and domestic water supply.

The ODEQ monitors selected water bodies for water quality. The ODEQ has analyzed water quality across the state and lists streams by basin. The ODEQ is in the process of developing a new list from the 2010 data call. The Environmental Protection Agency (EPA) submitted over 800 additions to the draft list in the summer of 2012. The current 303(d) list dates back to 2006. Within the planning area, 7 lakes and 158 streams are listed on the 2006 303(d) list of impaired waters (Oregon/Washington BLM 2013). The water bodies are listed due to failing to meet water quality standards for the following criteria:

- Temperature, Dissolved Oxygen, Turbidity, Weeds, or Algae for the lakes
- Temperature, Dissolved Oxygen, Fecal Coliform, Heavy Metals, or Herbicides for most of the streams

The major water quality concern for streams in the planning area has been water temperature, sediment, flow, and habitat modification. Of the 1,495 segments of 303(d) listed streams in the Core Area habitat, these are the top reasons for the ODEQ listing (Oregon/Washington BLM 2013). These water temperature concerns generally correlate to the beneficial use of fish spawning and rearing habitat. Conditions that affect stream temperature can be summarized as amount of near-stream vegetation, channel shape, and hydrologic flow regime. Many of these conditions are interrelated and many vary considerably across the landscape. For example, channel width measurements can change greatly over even small distances along a stream. Some conditions vary daily and/or seasonally. Stream orientation from a north-south to an east-west can change solar heating considerably when stream width and vegetation type remain the same.

Removal of riparian vegetation and the shade it provides contributes to elevated stream temperatures (Rishel et al. 1982; Beschta 1997). Channel widening can similarly increase solar loading. The principal source of heat energy delivered to the water column is solar energy striking the stream surface directly (Brown 1969). Exposure to solar radiation can cause an increase in stream temperature. The ability of riparian vegetation to shade the stream throughout the day depends on aspect and vegetation height, width, density, and positions relative to the stream, as well as aspect the stream flows (streamside vegetation provides less shade on a north or south flowing stream than on an east or west flowing stream).

There are natural and human-induced causes of stream degradation due to removal of riparian vegetation and destabilization of streambanks. Bank erosion

from high water volume and velocity during intense precipitation events can alter the bed and banks. The land uses most commonly associated with stream degradation in the planning area is improper livestock grazing as it is most prevalent. Other land uses associated with degraded streams may include road location, construction and use, trails, water withdrawal, mining activities, reservoir storage and release, altered physical characteristics of the stream, and wetlands alteration.

Groundwater

Groundwater is used for irrigation, domestic use, and livestock use. The quality of the groundwater is a function of the chemical makeup of the underground formation containing the water. Most of the planning area contains good quality water, but the water is usually hard and contains moderate amounts of dissolved minerals.

Springs and seeps occur in areas where water from aquifers reaches the surface. Many springs begin in stream channels; others flow into small ponds or marshy areas that drain into channels. Some springs and seep areas form their own channels that reach flowing streams, but other springs lose their surface expression and recharge alluvial fill material or permeable stratum.

Springs and seeps are important to aquatic habitats because of the perennial baseflow they provide to a stream. The outflow from springs in summer usually helps to maintain lower water temperatures. In winter, especially in small streams, baseflow helps to maintain an aquatic habitat in an otherwise frozen environment.

Springs can be disturbed either by management activities that have affected the volume of water available to the vegetation and soils where springs begin, or by activities that have affected the vegetation and soils directly. Activities, such as livestock or wild horse grazing and watering, recreation use, mining, road construction, and vegetation management, can affect spring systems. Activities such as well drilling or blasting can affect springs by reducing the amount of water in their aquifers or by affecting subsurface flow patterns.

Water Quantity

The peak flow times are connected with the spring runoff and snow melt with a decrease to near base flow during the month of June or July, depending on winter accumulations of snow. Seasons and years of low water yield are particularly crucial periods for most of the beneficial uses of water in the planning area. During the summer drought experience in 2012, many streams went completely dry, and groundwater needed to be accessed through pumping for the first time in at least a decade.

Water Rights

The State of Oregon recognizes instream water rights for the public benefit to maintain sufficient flows to protect recreation, fish, wildlife, and other river-

related resources. Instream water rights are applied for by the BLM, the ODEQ, the Department of Parks and Recreation, and the Department of Fish and Wildlife to the State's Water Resource Commission. The priority date for instream water rights is the date the application is submitted to the Oregon Water Resources Department. These rights are subject to senior water rights. The Oregon Water Resources Department has identified desired flow levels to protect recreation, fish, and wildlife. These flow levels are not water rights; rather, the Oregon Water Resources Department uses them in its calculations of water availability. There are approximately 5,971 water storage impoundments, pipeline systems, groundwater wells, and irrigation diversions on BLM-administered land in the planning area, where applications have been made or have state-approved water rights (Oregon/Washington BLM 2013).

Federal reserved water rights may be applied to certain springs and waterholes pursuant to Public Water Reserve No. 107, Executive Order of April 17, 1926. Public Water Reserve 107 reserves the amount necessary to accomplish the primary purpose of the reservation. There was no intent to reserve the entire yield of each public spring or waterhole withdrawn by the executive order. The purposes for which these waters were reserved are limited to domestic human consumption and livestock watering on BLM-administered lands. This reservation is limited to springs and waterholes on lands within the public domain prior to April 17, 1926. Also, federal reserved water rights for WSRs are found in the creation of water rights in section 1284(c), of the Wild and Scenic Rivers Act of 1968.

Livestock operators' contributions to constructing and maintaining range improvements have benefited management of BLM-administered lands. In many areas, water developments are providing water for wildlife and have improved livestock distribution and benefited grazing management.

There are a variety of tools, authorities, and strategies available to the BLM to achieve instream flow levels. These tools include leasing (in the short term) and transferring existing BLM consumptive use rights to instream uses (in the long term) and entering cooperative agreements with the State of Oregon and other agencies for the purchase of water rights from willing sellers for transfer to instream uses.

3.17.2 Trends

There are numerous examples of measurable changes in stream and riparian-habitat qualities that indicate degraded conditions in the Malheur, Owyhee, and John Day river basins of eastern Oregon. Major habitat changes include the loss of riparian vegetation and increased canopy opening widths adjacent to stream channels; loss of riparian vegetation and decline of large woody debris in stream channels; increases in water temperatures from minimal shading by riparian canopies and shallow-sediment and debris-laden stream channels; accumulation of fine sediments and loss of gravel and pool attributes in stream channels

because of land-uses that alter streamflow regimes and sediment budgets; and loss of water in stream channels and riparian areas because of water diversion practices (Wissmar et al. 1994).

Even so, functional riparian plant communities can usually be reestablished and restored, often over relatively short periods of time. Recovery of riparian vegetation can also provide a parallel improvement in stream temperatures, overall water quality, and instream habitats for a variety of fish and aquatic organisms. Improving riparian vegetation and channel conditions may also beneficially affect moisture regimes of meadow systems and increase forage productivity. There are major opportunities for improving water temperatures and aquatic habitats for many streams in eastern Oregon and the upper Columbia River Basin. Increased levels of shading for water quality limited streams would greatly improve summertime stream temperatures in most situations, which improves water quality. Many land management practices have changed to include providing summertime shade in riparian areas. It may even be possible to reduce maximum temperatures so they no longer exceed state water quality standards. However, it is clear that achieving improved levels of riparian shade and decreased summertime temperatures will require landowners to continue to change those management practices that have contributed to current conditions. It is also clear, that without such changes, fish and other aquatic organisms will continue to feel the heat (Beschta 1997).

Demands on water resources have increased in Oregon over the past few decades. Although most early water rights were established for irrigation and mining, today's demand includes municipal water supplies, commercial and industrial supplies, and maintenance of adequate streamflows for fish, recreation, and water quality.

The availability of water in much of the planning area is limited and may hamper additional developments that depend on water. Future water development for wildlife, recreation, and livestock would require a State of Oregon water right before project implementation could occur.

General Technical Report RMRS-GTR-285 recently released in August 2012 reviews existing climate models that predict species and vegetation changes in the western United States, and it synthesizes knowledge about climate change impacts on the native fauna and flora of grasslands, shrub lands and deserts of the interior American West. In summary, the report predicts less water and water availability, a difference in timing of delivery, and increased stress on vegetation. In particular, the report predicts longer and more severe droughts, changes in precipitation runoff and potential for changes in flooding patterns, changes in the relationships among plants, water, nutrients, and soils on grazed lands, and increased susceptibility of ecosystems to invasion of nonnative species (Finch 2012).

The type of burning conditions experienced in the summer of 2012 are expected to occur more frequently as the climate continues to change (very high temperatures and very low relative humidity for prolonged periods in combination with very dry conditions). These conditions are expected to be the trend in the tri-state region of Oregon, Idaho, and Nevada until climate change takes a new path.

3.18 LANDS WITH WILDERNESS CHARACTERISTICS

The purpose and need of the national GRSG planning effort is limited to making land use planning decisions specific to the conservation of GRSG habitats. No decisions related to the management of lands with wilderness characteristics will be made as part of this planning effort. Other program management direction (e.g., land tenure) may generally affect wilderness characteristics (e.g., exclusion areas would benefit lands with wilderness characteristics but would not guarantee protection because the purpose of and need for the exclusion area in that management direction is not specifically tied to wilderness characteristics).

As part of the original FLPMA Section 603-mandated inventories, inventories were conducted during past RMP revisions and amendments efforts, and through other various lands with wilderness characteristics inventory updates that have recently taken place. Inventories for wilderness characteristics were updated over the past decade to reflect the most up-to-date lands with wilderness characteristics baseline information for this planning area. These inventories were based on draft guidance that led to the development of BLM IM 2011-154, Requirement to Conduct and Maintain Inventory Information for Wilderness Characteristics and to Consider Lands with Wilderness Characteristics in Land Use Plans. For inventories that were conducted after 2011, findings were documented following guidance in BLM IM 2011-154, Requirement to Conduct and Maintain Inventory Information for Wilderness Characteristics and to Consider Lands with Wilderness Characteristics in Land Use Plans, which is now encompassed in BLM Manuals 6310 (BLM 2012j) and 6320 (BLM 2012k). Lands with wilderness characteristics inventories will be updated for any site-specific NEPA analyses that are conducted in the planning area to determine if a project will have impacts on lands with wilderness characteristics identified through previous or updated inventory efforts.

3.18.1 Existing Conditions

Conditions of BLM-Administered Lands

There are approximately 102 lands with wilderness characteristics units in the planning area encompassing over 1.3 million acres. Of these lands with wilderness characteristics units, approximately 697,900 acres include PPH, approximately 576,200 acres include PGH, and approximately 96,700 acres contain neither PPH nor PGH (**Table 3-53**, Lands with Wilderness Characteristics). There are approximately 1.2 million acres in the planning area

Table 3-53
Lands with Wilderness Characteristics

District	Acres			
	Non- Habitat	PGH	PPH	Total
Burns	103	1,722	15,211	17,036
Lakeview	8,885	10,386	13,210	32,481
Prineville	2,194	39,980	24,950	67,124
Vale	85,565	524,088	644,522	1,254,176
Total	**96,747**	**576,176**	**697,893**	**1,370,817**

Source: Oregon/Washington BLM 2013

on which updated lands with wilderness characteristics inventories have not been completed. These lands could potentially contain wilderness character.

No available statewide GIS data track how lands with wilderness characteristics are being managed, and there is no statewide GIS database available for GIS-supported analysis. As such, all lands with wilderness characteristics in this analysis are treated as if their wilderness characteristics are not protected.

3.18.2 Trends

As the BLM completes its inventories of wilderness characteristics, it anticipates that more units might be determined to contain wilderness characteristics. Until an inventory can be completed for all lands in the decision area, lands not yet inventoried for wilderness characteristics will be evaluated when any surface-disturbing activity is proposed. Any lands with wilderness characteristics found in this inventory update will be considered in alternative formulation, and impacts of the proposal on their wilderness characteristics will be analyzed and disclosed in individual NEPA analyses. Absent specific management direction protecting wilderness characteristics, is the BLM anticipates that some characteristics may degrade over time depending upon on BLM-administered activities, which will be subject to project-level NEPA.

3.19 CLIMATE CHANGE

Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. Climate change includes both historic and predicted climate shifts that are beyond normal weather variations. Greenhouse gas emissions from human activities have been identified as a major factor in climate change (IPCC 2007). In December 2012, the Department of the Interior issued manual direction concerning climate change (523 DM 1) directing its agencies to consider the effects of climate change on BLM-administered resources and to consider the greenhouse gas emissions and carbon storage implications of BLM activities during land use and project planning. The BLM National Office is in the process of developing implementation direction for these manual requirements.

3.19.1 Existing Conditions

Conditions of the Planning Area and BLM-administered Lands

Climate change is defined by the Intergovernmental Panel on Climate Change as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and persist for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity" (IPCC 2007). Climate change is generally described on a global, national, or regional scale (state or multi-state), while greenhouse gas emissions in the US are generally reported on a national or statewide scale.

USFWS identified certain aspects of climate change of particular concern for sage-grouse. These include increased potential for further expansion of invasive plant species and conifers into sage-grouse habitat; changes in fire frequency, size, and severity; and potential for expansion of West Nile Virus into areas that are currently too cold for the vector. All these factors are influenced by changes in temperature, precipitation, and snowpack. In addition, expansion of invasive plant species and conifers is influenced by atmospheric carbon dioxide (CO_2) concentrations. Climate change also has implications on the ability of sagebrush and other native vegetation to persist within the planning area.

The climate within the planning area is considered to be continental, although there are some maritime climatic influences in winter, especially within the Upper Deschutes RMP area. The precipitation regime is winter-spring dominant, but high interannual variability in precipitation amount is a key characteristic of the planning area, ranging from less than 10 inches to over 20 inches. Winter precipitation is typically rain-dominated within much of the Southeastern Oregon RMP area and equally likely to be rain or snow-dominated in the remainder of the planning area, depending on the type of year. Snow-dominant winter precipitation is restricted to the higher elevations around Steens Mountain, Hart Mountain, the Trout Creek and Pueblo Mountains, and in much of the Upper Deschutes RMP area. Summers are typically very dry. Frost can occur nearly any month of the year on most of Burns and Lakeview Districts.

Invasive Plant Species. Although there are several invasive plant species of concern, scientifically, the most is known about cheatgrass. Cheatgrass is typically limited by precipitation at the lower elevations and temperature at the higher elevations (Chambers et al. 2007) and tends to be most problematic where the soil moisture regime is xeric and the soil temperature regime is mesic. Medusahead can displace cheatgrass, especially on soils with high clay content (Mangla et al. 2011). Little is known about the autecology of other invasive plant species, such as ventenata, but populations of all such grasses tend to be higher where conditions are warmer. The current winter-spring precipitation regime also favors cheatgrass and other invasive plant species (Bradford and Laurenroth 2006). A few studies suggest that increasing

atmospheric carbon dioxide concentrations has favored more rapid spread of cheatgrass in recent years by increasing its flammability and drought tolerance (Ziska et al. 2005; Blank et al. 2006) such that cheatgrass is becoming more problematic where the soil moisture regime is more arid. While no similar studies have been conducted on other invasive plant species, there are enough ecological similarities between these species that they may also be favored by increasing atmospheric carbon dioxide concentrations. Summer (June to September) precipitation is one of the better predictors of cheatgrass distribution; as summer precipitation increases, cheatgrass tends to decrease (Bradley 2009).

Western Juniper. Western juniper also tends to be limited by precipitation at lower elevations and temperature at higher elevations (Miller and Wigand 1994; Miller et al. 2005; Romme et al. 2009). It is most common where the soil temperature regime is frigid and the soil moisture regime is mesic. Western juniper expansion within the planning area coincided with both Euro-American settlement and the resulting land use changes, and increased winter precipitation, which favors expansion of woody plants (Romme et al. 2009). Juniper expansion has continued under conditions normally associated with the beginning of range contractions, leading to the current theory that increased atmospheric carbon dioxide concentrations favor continued expansion and rapid growth of juniper trees (Miller and Wigand 1994; Soulé et al. 2004) and may be allowing juniper to expand into some areas where the soil moisture regime is arid.

Sagebrush. Few studies have examined how climate change may affect big and low sagebrush and native perennial grasses, while no studies have examined native forbs. Mountain big sagebrush typically dominates where annual precipitation averages 13 to 18 inches, Wyoming big sagebrush dominates in the 7- to 12-inch precipitation range, and low sagebrush dominates on shallow soils in the 8- to 16-inch precipitation range (Miller et al. 2011b). Bradley (2010) also reported that sagebrush species were typically found where precipitation exceeded 7 inches but was less than 20 inches. June precipitation and maximum temperature, and August precipitation and annual precipitation are predictors of sagebrush persistence (Bradley 2010).

3.19.2 Trends

Observed Trends

In general, annual average temperatures and seasonal temperatures are increasing across the planning area, with the single exception of a slight decline in fall temperatures in the center of the planning area. Minimum temperatures in all seasons and annually and temperatures in winter have increased the most. Annual precipitation has increased across the planning area as well, with the greatest increases in spring and summer. Precipitation has declined in fall in the eastern and western thirds of the planning area, with a greater decrease in the

western third near the Cascade Mountains. The observed changes in temperature are largely consistent with observed national and regional trends (IPCC 2007; Karl et al. 2009; Mote et al. 2013). The overall increase in precipitation is also consistent with observed national trends, but the seasonal changes are not. Nationally, precipitation has increased in winter and declined in summer (IPCC 2007; Karl et al. 2009). Regionally, seasonal changes in precipitation have been more variable, but consistently increased in spring (Mote et al. 2013).

April 1 snow water equivalent has decreased at most Snotel stations, with two stations gaining April 1 snow water equivalent. One station, Fish Creek on Steens Mountain, is located just above 7,100 feet, such that warming temperatures may have resulted in an increase in the moisture content of the snow. The South Mountain station in Idaho is harder to understand, particularly since it is located at a lower elevation than the Silvies station on Steens Mountain, which is losing April 1 snow water equivalent. In general, the observed April 1 snow water equivalent trend is consistent with observed national and regional trends (IPCC 2007; Karl et al. 2009; Mote et al. 2013).

Conditions in the planning area are becoming warmer and effectively drier, although at different rates and with important seasonal differences. With decreasing precipitation in fall and little increase in winter precipitation, the eastern and western thirds of the planning area may be storing less water in the deep soil layers. The entire planning area may be shifting towards a spring-summer dominant precipitation regime. If the current trends continue, that shift in precipitation regime will eventually affect the ability of both basins to support woody vegetation. Juniper and sagebrush are typically dependent on the water stored in deeper soil layers during fall and winter.

Increasing minimum temperatures may have adverse implications for any plant species with a chilling requirement. Chilling requirements are an adaptation that reduces the probability of premature bud burst during a warm period in late winter or early spring. Species that do not meet their chilling requirement may experience delayed bud burst or reduced bud burst and, consequently, delayed growth and lower productivity. Whether any species important for sage-grouse food and cover has a chilling requirement is not known. Increasing minimum temperatures in spring and summer also have implications for the hatch timing and growth rates of insects that may be important foods for sage-grouse chicks since insect phenology is temperature dependent.

Projections

For the Pacific Northwest (Oregon, Washington, Idaho, and western Montana), the projections are somewhat different from the US as a whole (Mote and Salathé 2010). Most climate models tend to over-predict precipitation as compared to observed means in the Pacific Northwest, so must be corrected in any projections. In the Pacific Northwest, temperatures are expected to

increase by about 1 to 3°F by the 2020s, 1.5 to 5°F by mid-century, and 3 to 10°F by the end of the century. The greatest warming is expected in summer, and least is expected in spring. Annual precipitation is expected to change little, but summers should become drier and all other seasons possibly wetter. As with the US as a whole and globally, the frequency of extreme precipitation events, heat waves, and droughts are expected to increase, and snowpack is expected to decrease.

While the observed and projected changes in temperature and precipitation are expected to increase the length of the fire season and daily burning periods, whether wildfire size and fire season severity will change and in what direction is not clear. Semi-arid ecosystems are fuel-limited, requiring one or more years of average to above-average grass production to create sufficient fuel quantity and continuity to carry fires. Even invasive plant species, which create continuous fuelbeds, do not necessarily produce enough fuel to readily carry a fire every year, although the threshold amount needed is not known. If current projections concerning drought frequency, severity, and duration are accurate, then the annual acres burned could decline as more years lack sufficient fuel to support fires. Conversely, these same droughts could also reduce the abundance of perennial grasses and promote the expansion of annual grasses, thereby increasing fuel continuity.

Uncertainty

Climate change is also a source of uncertainty concerning the expected effects of management activities. These uncertainties arise from several sources. One source is due to the climate models themselves. Each model makes somewhat different assumptions concerning climate dynamics and which factors are more important drivers than others. How greenhouse gas forcing will change is another source of uncertainty, such as the rate of increase, and whether unforeseen events might result in sudden increases or possibly decreases in atmospheric greenhouse gas concentrations. Thirdly, climate scientists have much lower confidence in precipitation projections (IPCC 2007), and many of the vegetation responses to both natural disturbances and management activities are dependent on the amount and timing of precipitation. A fourth source of uncertainty is the inability at present to downscale climate projections to a scale relevant for land management decisions. A fifth source of uncertainty arises from interannual and interdecadal climate variability, which means climate change is not linear, but proceeds in fits and starts. Lastly is that individual plant species and plant community dynamics are more sensitive to changes in climate variability than to changes in climate means, yet changes in means are what is reported.

3.20 SOCIAL AND ECONOMIC CONDITIONS (INCLUDING ENVIRONMENTAL JUSTICE)

Due to the nature of social, economic, and environmental justice conditions, the social and economic analysis is based on a somewhat different area for analysis than is used for other resources. Specifically, the Socioeconomic Study Area is

made up of counties within the Oregon sub-region that contain sage-grouse habitat and within which social and economic conditions might reasonably be expected to change based on alternative management actions. In addition, the BLM reviewed the need to include additional counties that may not contain habitat but are closely linked from an economic or social perspective to counties that do contain habitat. This latter category includes what are sometimes called "service area" counties, or counties from which businesses operate that regularly provide critical economic services, such as recreational outfitting or support services for the livestock grazing sector, within the counties that contain habitat (METI Corp / Economic Insights of Colorado 2012). Including service area counties is important because a change in economic activity in a county containing habitat may result in changes in economic activity within service area counties as well.

The Socioeconomic Study Area contains seven counties in Oregon, which together form a contiguous region in the eastern and southeastern portion of the state: Baker, Crook, Grant, Harney, Lake, Malheur, and Union. Each of these counties contains sage-grouse habitat.

Table 3-54, BLM Plans, Management Units and Counties within the Socioeconomic Study Area, shows the planning documents that may be altered by the Oregon Sub-Regional EIS and the counties containing sage-grouse habitat within the area encompassed by those plans.

Table 3-54
BLM Plans, Management Units and Counties within the Socioeconomic Study Area

Plan or Document	Management Unit	Counties
Baker RMP and RMP Revision	Vale District	Baker, Union[1]
Brothers/LaPine RMP	Prineville District	Crook, Deschutes
Lakeview RMP and RMP Amendment	Lakeview District	Lake, Harney
Southeast Oregon RMP and RMP Amendment	Vale District	Malheur
Steens Mountain CMPA RMP; Andrews Management Unit RMP	Burns District	Harney[2]
Three Rivers RMP	Burns District	Harney, Lake
Upper Deschutes RMP	Prineville District	Deschutes, Crook[3]

CMPA Cooperative Management and Protection Area
EIS Environmental Impact Statement
RMP Resource Management Plan

[1] The Baker RMP planning area contains a very small part of Malheur County, but Malheur was not included in the social/economic study area for the Baker RMP EIS (BLM 2011c). The Baker RMP planning area also contains several other counties (Umatilla, Morrow, Wallowa, and Asotin, Washington), but these counties do not contain sage-grouse habitat.

[2] The socioeconomic analysis unit for the Steens Mountain CMPA/Andrews Management Unit Draft EIS included a small part of Malheur County, but Malheur was excluded from that analysis unit because the area in question was remote and sparsely populated (BLM 2004b).

[3] Deschutes County is included in the secondary study area for the reasons noted in the text. The Upper Deschutes RMP also covers small portions of Jefferson and Klamath Counties, but these counties contain no sage-grouse habitat and do not serve as service areas; therefore, they are not included in the Socioeconomic Study Area.

The BLM also considered Deschutes County, Oregon, as constituting a "secondary" Socioeconomic Study Area, because two cities in Deschutes County (Bend and Redmond) provide critical economic services for recreational uses across southeastern Oregon. Because any effects on Deschutes County would be indirect, this section contains limited data on conditions within Deschutes County, focusing on what is necessary to provide appropriate context for the impact analysis provided in Chapter 4. Data summaries provided throughout this chapter include data for the seven counties within the primary Socioeconomic Study Area and do not include data for Deschutes County.[1]

3.20.1 Existing Conditions and Trends

Social Conditions

Social conditions concern human communities, including towns, cities, and rural areas, and the custom, culture, and history of the area as it relates to human settlement, as well as current social values.

Population and Demographics

Table 3-55, Population Growth, 1990-2010, shows current and historic populations in the Socioeconomic Study Area.

Table 3-55
Population Growth, 1990-2010

Geographic Area	1990	2000	2010	Percent Change (1990-2010)
Baker County, OR	15,317	16,741	16,134	5.3
Crook County, OR	14,111	19,182	20,978	48.7
Grant County, OR	7,853	7,935	7,445	-5.2
Harney County, OR	7,060	7,609	7,422	5.1
Lake County, OR	7,186	7,422	7,895	9.9
Malheur County, OR	26,038	31,615	31,313	20.3
Union County, OR	23,598	24,530	25,748	9.1
Socioeconomic Study Area	101,162	115,034	116,935	15.6
Oregon	2,842,337	3,421,399	3,831,074	34.8
United States	248,790,925	281,421,906	308,745,538	24.1

Sources: US Census Bureau 1990, 2000, 2010a

Since 1990, the population in Oregon has increased by 34.8 percent, a change 10 percentage points larger than the United States as a whole. Oregon grew in both decades, but grew faster between 1990 and 2000 than between 2000 and

[1] The BLM considered including Payette County in the secondary Socioeconomic Study Area because 33 percent of Payette County residents work in Malheur County. However, according to local officials, much of the labor flow from Payette County to Malheur consists of individuals who work at the Snake River Correctional Institution. This labor flow would likely not change as a result of alternative management actions.

2010. When the Oregon economy was rapidly expanding during the 1990s and mid-2000s, net migration accounted for nearly three-fourths of the population growth (Oregon Department of Administrative Services 2011).

Population in the Socioeconomic Study Area as a whole increased by 15.6 percent from 1990 to 2010, a rate of growth almost ten percentage points lower than the United States as a whole. Only one of the seven counties in the Study Area grew faster than the nation as a whole: Crook County – although much of this growth was focused in the western portion of the county.

In general, the Socioeconomic Study Area is characterized by a low population density, with much of the lands being state or federally owned (Hanus 2011).

With a population of 13,082 people, La Grande is the county seat of Union County and the most populous city in the county (US Census Bureau 2010a). The town of Lakeview, which is the county seat and primary economic center of Lake County, is the location of many federal, State, and local government offices.

The "Communities of Place" section, below, provides more information about additional cities and towns in the Socioeconomic Study Area, as well as the character and history of the counties. **Table 3-56**, Demographic Characteristics, Share in Total Population (percent), 2010, shows age and gender characteristics of the population in each county of the Socioeconomic Study Area.

Table 3-56
Demographic Characteristics, Share in Total Population (percent), 2010

Geographic Area	Women	Under 20 Years of Age	20 to 39 Years of Age	40 to 64 Years of Age	65 Years of Age or Older
Baker County, OR	49.5	22.3	18.3	37.4	22.0
Crook County, OR	50.4	24.0	19.8	36.3	20.0
Grant County, OR	50.3	21.1	17.1	38.1	23.6
Harney County, OR	49.1	24.8	19.6	36.8	18.9
Lake County, OR	47.3	20.9	19.3	39.4	20.4
Malheur County, OR	45.9	28.7	26.0	30.4	15.0
Union County, OR	50.8	26.1	24.0	33.3	16.7
Socioeconomic Study Area	48.9	25.1	22.0	34.5	18.4
Oregon	50.5	25.4	26.9	33.9	13.9
United States	50.8	26.9	26.8	33.2	13.0

Source: US Census Bureau 2010b

The demographic characteristics of both Oregon and the Socioeconomic Study Area generally follow the same trends as the country as a whole. Approximately

50 percent of the population is female, and approximately 60 percent of the population is between the ages of 20 and 64. The most substantial distinction between national trends and the trends of the Socioeconomic Study Area is the percentage of the population within the Socioeconomic Study Area that is 65 years of age or older, 18.4 percent, which is 5.4 percentage points higher than the national percentage. The proportion of the population over 65 years of age is at least 7 percentage points higher than the national percentage in four counties (Grant, Baker, Crook, and Lake) within the Socioeconomic Study Area. Additionally, a meaningful distinction exists between national trends and the percentage of the population within the Socioeconomic Study Area that is between the ages of 20 and 39. Twenty-two percent of the population in the Socioeconomic Study area is between the ages of 20 and 39, which is 4.8 percentage points lower than the national percentage. The proportion of the population between 20 and 39 years of age is at least 7 percentage points lower than the national percentage in five counties (Grant, Baker, Lake, Harney, and Crook) within the Socioeconomic Study Area.

Environmental Justice provides information on minority, low-income, and tribal populations.

Interest Groups and Communities of Place

There is a range of interest groups in the Socioeconomic Study Area, and the positions advanced by these groups include some overlapping interests and some divergent interests. These groups sometimes define and measure concepts such as sustainable use and resource conservation differently, and different definitions and measures of sustainability sometimes result in different conclusions about how land and resources should be managed. There are also groups that represent coalitions of interest groups. Interest groups within the Socioeconomic Study Area include the following: federal agencies, state agencies, county agencies, local agencies, congressional representatives, local representatives, academic institutions, civic organizations, local chambers of commerce, environmental groups, land conservation groups, outdoors groups, ATV/motorcycle/4x4 clubs, equestrian clubs, local school boards, farm associations, and various business groups. Specific types of business interest groups include the following: real estate, tourism, renewable energy developers (e.g., wind, solar, and geothermal developers), farms and ranches, textile manufacturers, livestock growers, and news media.

Stakeholder groups currently benefitting from BLM-administered lands within the Socioeconomic Study Area include rockhounds, grazing permittees, timber companies and workers, mining companies and workers, local governments, and subsistence users. Stakeholder groups also include recreational users such as hunters, fishermen, OHV users, Wilderness Study Area visitors, sightseers using motorized vehicles, hikers, horseback riders, campers, wildlife viewers, boaters and rafters, eco-tourists, and historical tourists. Commercial businesses that hold special recreation permits are also stakeholders (BLM 2001).

The Socioeconomic Study Area includes various communities of people who are bound together because of where they reside, work, visit, or otherwise spend a continuous portion of their time. The majority of the communities within the Socioeconomic Study Area are characterized as rural and have strong connections with the outdoors and recreational activities (BLM 2004c). During public scoping, comments emphasized the preservation of open space, wildlife habitat, and dispersed recreation as being important to individual quality of life (BLM and Forest Service 2012; BLM 2012k). Outdoor recreation activities in the Socioeconomic Study Area include fishing, hunting, and wildlife viewing, among others (Hanus 2011).

Most of the communities in the Socioeconomic Study Area, both currently and historically, have a strong economic reliance on the BLM-administered lands in central Oregon, primarily for livestock grazing and forest products (BLM 2004c). In fact, much of the land in the Socioeconomic Study Area is publicly owned, including over 75 percent in Harney, Lake, and Malheur Counties (Hanus 2011). During public scoping, some commenters noted that livestock grazing activities on BLM-administered lands provided substantial economic benefits to communities across the state. These commenters cited the combined use of private and BLM-administered lands by livestock grazing operations in the Great Basin region as important to the continued sustainability of many ranch operations and the rural communities where these ranches are located (BLM and Forest Service 2012).

Over the last 20 to 30 years, however, many of these counties have seen a decline in the timber and forest products industry on BLM-administered lands, decreasing the overall contribution of this industry to the economies in the study area (BLM 2004b; BLM 2012k). Few timber handling facilities and jobs remain in some counties in the study area (Headwaters Economics 2013). A report on the socioeconomic conditions in areas in Oregon with sage-grouse habitat noted that a shift in public land management since the 1990s has affected these timber-related industries, along with other industries dependent on natural resources, such as livestock grazing (Hanus 2011).

Baker and Union Counties. Baker and Union Counties have outdoor-oriented communities with populations that have been fairly stable over the last 20 years (increasing by 5.3 percent and 9.1 percent respectively). As with many rural areas in Oregon, economic activity has shifted in recent years from the timber and forest products industry and, especially in Baker County, the gold mining industry to industries dominated by agriculture, recreation and tourism, and services (Baker County 2012). Baker County, and to a lesser extent Union County, is a "bedroom community" for workers who live in the area but work elsewhere. BLM-administered lands cover around half of land area in Baker and Union Counties (approximately 52 percent and 47 percent, respectively), and these lands play an important part in the continuation of current and historically important economic activities and the ability of county residents to maintain

their way of life (Baker County 2012; Union County Commissioners 2012). For example, the Baker County Commissioners have expressed an interest in speeding up the approval of mining plans of operations on BLM-administered lands, particularly gold mines, as a way to stimulate economic growth (Baker County 2012).

Crook County. Historically, the economy of Crook County was based on agriculture, livestock grazing, and the timber industry (Crook County 2012). In Crook County, historic economic drivers were strongly connected to BLM-administered lands, which cover approximately 50 percent of Crook County land area. While agriculture and livestock grazing and the timber industry remain important for Crook County, recreation and lifestyle relocation has recently played an increasing role in driving the economy and subsequent rapid population growth (BLM 2004c). Centrally located Crook County is also experiencing rapid population growth, with an increase of approximately 49 percent in the past 20 years (Crook County 2012). Crook County's county seat, Prineville, has a population of 10,370 and is located within an hour's drive from Bend. Even though Crook County has experienced rapid growth, its "wide open spaces" and natural resource-based economy remains important to residents (BLM 2004c). While some community members report increased cultural and retail opportunities as beneficial impacts of expansion in Crook County, others note that changes to historically rural ways of life and the development of towns as "bedroom communities" for those working in the increasingly urban portions of the county may be seen as negative impacts (BLM 2004c).

Grant County. Grant County has a small, rural population that, like all counties in the Socioeconomic Study Area, has historically made their living off of livestock grazing, mining (particularly gold and placer mining), and later forest products. However, unlike the other counties discussed above, Grant County has seen its population shrink by five percent in the past 20 years because of outmigration and an aging population (US Census Bureau 1990, 2000, 2010a; BLM 2012k). Although they have declined in economic importance, traditional economic activities that make use of BLM-administered lands (e.g., livestock grazing, mineral development and forest product sales), which make up over 60 percent of the county, still contribute to the county's social setting and remain culturally important to residents (BLM 2012k). Recreational activities, such as hunting, have contributed to the area's economy in recent years (BLM 2012k). The county seat is Canyon City, but the City of John Day is the main economic center and has the largest population in Grant County (Grant County Chamber of Commerce 2012).

Harney County. Harney County is a rural county with one of the lowest population densities in the state. The county's early development was primarily a result of the cattle industry and homesteading in the 1860s (Grasty 2012). The county cites growth and developments in the grazing and forest products

industries as the reason for the area's more recent growth (Harney County Planning Department 2009). Over the past several decades the role of non-service-related sectors (including farming, mining, manufacturing, construction, and the combination of agricultural services, forestry, fishing and related sectors) in supporting jobs has declined compared to service-related sectors and government (US Department of Commerce 2012a). Harney County officials are actively pursuing the attraction of new businesses to enhance and diversify the economy; much of the county's economic strategic plan focuses on job creation related to the sustainable use of natural resources. According to county officials, cattle and hay production represent primary industries in the county. Ranches on private lands range in size from a few acres with only a few cattle to private holdings with hundreds or occasionally thousands of acres with hundreds of animals, irrigated hay land and necessary grazing permits on BLM-administered lands (Grasty 2012). Due to its rural nature, the social character of Harney County has evolved primarily around the cowboy culture and traditional outdoor activities, including hunting and fishing (Grasty 2012). The annual Harney County Fair, Rodeo and Race Meet, which dates back to 1888, is a significant community event and is intimately tied to the ranching community (Harney County 2012; Grasty 2012). Some local residents view private lands within the county as "islands in a sea of public lands" and, as in other parts of the country, some local officials feel that regulation of BLM-administered lands threatens local control and social culture (Grasty 2012).

Lake County. Lake County has a strong historic and current social connection to public land, with a history of agriculture and homesteading activities. In the early 1900s, there was an employment boom in the Fort Rock and Christmas Valley portions of the county, and nearly all the available land within these areas was homesteaded. The contemporary economy is driven by agriculture, timber, livestock activities, and mining (BLM 2003a; Lake County 2012). In addition, the county bills itself as a destination for outdoor recreation. Motorized recreation is popular, and the Christmas Valley Sand Dunes, the largest dunes in Oregon and or the Pacific Northwest, are located within Lake County. An abundance of lakes and rivers provide opportunities for fishing and water recreation, and excellent "thermals" provide opportunities for hang-gliding that have earned the town of Lakeview the title "the Hang Gliding Capitol of the West" (Lake County 2012; Lake County Chamber of Commerce 2012). Lake County officials also note the importance of ranching to the social fabric of the county, including contributions to county fairs, rodeos, and 4-H clubs (Kestner 2012).

Malheur County. Malheur County, Oregon's second largest county by area, is primarily rural, and BLM-administered lands comprise approximately 73 percent of the total land area (BLM 2001; Malheur County 2012). The largest town, Ontario, lies on the Snake River, and the border with Idaho and has strong social and economic ties with several towns across the state line, including Payette and Fruitland; for example, some shoppers in these towns travel from Idaho to Oregon in part to take advantage of Oregon's lack of sales tax. The

county cultivates a large amount of produce, including russet potatoes, and a Heinz (formerly Ore-Ida) processing facility is among the larger employers. The rural, "small-town" atmosphere of Malheur County is valued by current residents and is a characteristic attracting newcomers (BLM 2001). Population grown 20 percent in the county over the last 20 years. Malheur County is primarily open rangeland, with irrigated agriculture in the Western Treasure Valley area of the county serving as the center for farming (BLM 2001). Comments received during scoping noted the importance of these economic activities to local residents, particularly related to the ranching community in Malheur County and mining projects, such as the Calico Grassy Mountain Project mine. Communities in Malheur County tend to have high agricultural, mining, and government specializations, indicating the importance of these activities to their local economies (BLM 2001). Vale is the county seat, but Ontario is the main population and business center, with a population exceeding 11,000 (Malheur County Economic Development 2012).

Land Use Plans

BLM-administered and other federal land in the Socioeconomic Study Area is intermingled with state and private lands. County governments have land use planning responsibility for the private lands located within their jurisdictions. County-level LUPs were identified for all seven counties within the Socioeconomic Study Area (Baker County 1991; Crook County Planning Department 2003; Grant County Planning Department 1996; Harney County Planning Department 2009; Lake County Board of Commissioners 1982; Lynn P. Steiger & Associates 1979; Malheur County 1982). All seven counties with identified LUPs include explicit economic development components.

Economic Conditions

Economic analysis is concerned with the production, distribution, and consumption of goods and services. This section provides a summary of economic information, including trends and current conditions. Trends are provided based on data from 2000 to 2010. This data set was selected to provide an acceptable baseline from which to present impacts, which are described in Chapter 4. It also identifies and describes major economic sectors in the Socioeconomic Study Area that can be affected by management actions. Most likely affected would be those economic activities that rely or could rely on BLM-administered lands, such as recreation and livestock grazing.

Economic Sectors, Employment and Personal Income

The distribution of employment and income by industry sector within the Socioeconomic Study Area is summarized in **Table 3-57**, Employment by Sector within the Socioeconomic Study Area, and **Table 3-58**, Labor Income by Sector and Non-Labor Income within the Socioeconomic Study Area (2010 dollars), below. See **Appendix P**, Detailed Employment and Earnings Data, for equivalent data by county.

Table 3-57
Employment by Sector within the Socioeconomic Study Area

Socioeconomic Study Area	Absolute			Percentage of Total		Percent Change 2001-2010
	2001	2010	Change 2001-2010	2001	2010	
Total Employment (number of jobs)	**63,487**	**62,234**	**-1,253**	**100.0%**	**100.0%**	**-2.00%**
Non-services related	**17,708**	**14,931**	**-2,777**	**27.90%**	**24.00%**	**-15.70%**
Farm	7,684	6,769	-915	12.10%	10.90%	-11.90%
Forestry, fishing, & related activities	1,155	990	-165	1.80%	1.60%	-14.30%
Mining (including oil and gas)	207	271	64	0.30%	0.40%	30.70%
Construction	2,815	2,607	-208	4.40%	4.20%	-7.40%
Manufacturing	5,847	4,294	-1,553	9.2%	6.9%	-26.6%
Services related	**31,157**	**32,740**	**1,583**	**49.1%**	**52.6%**	**5.1%**
Utilities	178	166	-12	0.3%	0.3%	-6.9%
Wholesale trade	1,552	2,084	532	2.4%	3.3%	34.3%
Retail trade	8,181	7,048	-1,133	12.9%	11.3%	-13.8%
Transportation and warehousing	1,463	1,442	-21	2.3%	2.3%	-1.4%
Information	651	563	-88	1.0%	0.9%	-13.6%
Finance and insurance	1,502	1,703	201	2.4%	2.7%	13.4%
Real estate and rental and leasing	1,701	2,083	382	2.7%	3.3%	22.5%
Professional and technical services	1,663	1,807	144	2.6%	2.9%	8.7%
Management of companies and enterprises	82	222	140	0.1%	0.4%	170.8%
Administrative and waste services	1,522	1,286	-236	2.4%	2.1%	-15.5%
Educational services	202	369	166	0.3%	0.6%	82.3%
Health care and social assistance	4,868	5,892	1,024	7.7%	9.5%	21.0%
Arts, entertainment, and recreation	732	801	68	1.2%	1.3%	9.3%
Accommodation and food services	3,793	4,060	267	6.0%	6.5%	7.0%
Other services, except public administration	3,067	3,217	150	4.8%	5.2%	4.9%
Government	**12,060**	**11,790**	**-270**	**19.0%**	**18.9%**	**-2.2%**
Federal	2,329	2,255	-74	3.7%	3.6%	-3.2%
State	2,984	3,229	245	4.7%	5.2%	8.2%

Table 3-57
Employment by Sector within the Socioeconomic Study Area

Socioeconomic Study Area	Absolute			Percentage of Total		Percent Change 2001-2010
	2001	2010	Change 2001-2010	2001	2010	
Local	6,747	6,306	-441	10.6%	10.1%	-6.5%

Source: US Department of Commerce 2012a

Table 3-58
Labor Income by Sector and Non-Labor Income within the Socioeconomic Study Area (2010 dollars)

Socioeconomic Study Area	Absolute (millions)			Percentage of total[1]		Percent Change 2001-2010
	2001	2010	Change 2001-2010	2001	2010	
Total Labor Earnings[2]	**$2,015.5**	**$1,997.2**	**-$18.3**	**100.0%**	**100.0%**	**-0.9%**
Non-services related	**$494.8**	**$415.8**	**-$79.1**	**24.6%**	**20.8%**	**-16.0%**
Farm	$70.0	$69.9	-$0.1	3.5%	3.5%	-0.2%
Forestry, fishing, & related activities	$60.8	$28.8	-$31.9	3.0%	1.4%	-52.5%
Mining (including oil and gas)	$35.4	$53.3	$17.9	1.8%	2.7%	50.6%
Construction	$92.3	$82.2	-$10.2	4.6%	4.1%	-11.0%
Manufacturing	$236.3	$181.5	-$54.8	11.7%	9.1%	-23.2%
Services related	**$826.4**	**$897.4**	**$71.0**	**41.0%**	**44.9%**	**8.6%**
Utilities	$13.0	$12.5	-$0.5	0.6%	0.6%	-3.5%
Wholesale trade	$53.6	$106.7	$53.1	2.7%	5.3%	99.0%
Retail trade	$215.0	$169.6	-$45.3	10.7%	8.5%	-21.1%
Transportation and warehousing	$57.6	$58.1	$0.5	2.9%	2.9%	0.9%
Information	$23.2	$19.2	-$4.0	1.2%	1.0%	-17.1%
Finance and insurance	$45.2	$41.8	-$3.5	2.2%	2.1%	-7.6%
Real estate and rental and leasing	$26.7	$29.1	$2.5	1.3%	1.5%	9.2%
Professional and technical services	$42.3	$51.2	$8.9	2.1%	2.6%	21.1%
Management of companies and enterprises	$3.4	$8.8	$5.3	0.2%	0.4%	154.9%
Administrative and waste services	$26.0	$23.4	-$2.6	1.3%	1.2%	-10.0%

Table 3-58
Labor Income by Sector and Non-Labor Income within the Socioeconomic Study Area (2010 dollars)

Socioeconomic Study Area	Absolute (millions)			Percentage of total[1]		Percent Change 2001-2010
	2001	2010	Change 2001-2010	2001	2010	
Educational services	$5.5	$5.2	-$0.3	0.3%	0.3%	-5.8%
Health care and social assistance	$164.9	$213.2	$48.3	8.2%	10.7%	29.3%
Arts, entertainment, and recreation	$9.0	$6.7	-$2.3	0.4%	0.3%	-25.4%
Accommodation and food services	$61.7	$66.5	$4.8	3.1%	3.3%	7.7%
Other services, except public administration	$79.2	$85.3	$6.1	3.9%	4.3%	7.7%
Government	**$615.5**	**$633.9**	**$18.4**	**30.5%**	**31.7%**	**3.0%**
Federal	$163.1	$174.3	$11.2	8.1%	8.7%	6.9%
State	$166.0	$179.3	$13.3	8.2%	9.0%	8.0%
Local	$286.3	$280.3	-$6.0	14.2%	14.0%	-2.1%
Non-labor Income[3]	**$1,398.7**	**$1,698.9**	**$300.2**	**45.6%**	**51.0%**	**21.5%**
Dividends, interest, and rent	$728.8	$691.7	-$37.1	23.8%	20.8%	-5.1%
Personal current transfer receipts[4]	$670.0	$1,007.2	$337.2	21.8%	30.2%	50.3%
Contributions to government social insurance[5]	**$248.1**	**$268.8**	**$20.7**	**8.1%**	**8.1%**	**8.3%**
Total Personal Income[6]	**$3,068.4**	**$3,331.5**	**$263.1**	**100.0%**	**$3,332**	**8.6%**

Sources: US Department of Commerce 2012a. Values reported in 2001 dollars were converted to 2010 dollars using the Consumer Price Index (BLS 2012a).
[1]Industry earnings are reported as a share of total labor earnings. Dividends, interest, and rent; personal current transfer receipts; and contributions to government social insurance are reported as a share of personal income.
[2]Total labor earnings are reported by place of work.
[3]Nonlabor income includes dividends, interest, and rent and personal current transfer receipts.
[4]"Personal current transfer receipts" are benefits received by persons for which no current services are performed. They are payments by government and business to individuals and institutions, such as retirement and disability insurance benefits.
[5]"Contributions for government social insurance" consists of payments by employers, employees, the self-employed, and other individuals who participate in the following government programs: Old-age, Survivors, and Disability Insurance; Medicare; unemployment insurance; railroad retirement; pension benefit guarantee; veterans' life insurance; publicly-administered workers' compensation; military medical insurance; and temporary disability insurance (US Department of Commerce 2012b).
[6]Total personal income is reported by place of residence.

The largest industry sector is the services related sector, which comprised 52.6 percent of total employment as of 2010. This reflects a growth rate of 5.1 percent from 2001 (compared to an overall employment growth rate of -2.0 percent from 2001). Compared to the services related sector, the non-services related sector and the government sector represented lower levels of employment, 24.0 percent and 18.9 percent, respectively. Retail trade (11.3 percent), farming (10.9 percent), and local government (10.1 percent) accounted for the largest shares of employment in 2010, followed by healthcare and social assistance (9.5 percent). The industries that demonstrated the largest growth between 2001 and 2010 were management of companies and enterprises, with an increase of 170.8 percent; educational services, with an increase of 82.3 percent; and wholesale trade, with an increase of 34.3 percent.

Appendix P, Detailed Employment and Earnings Data, provides county-level employment figures. The greatest difference in industry sector proportion between counties in 2010 was in the farm industry, which contributes 7.1 percent of total employment in Union County but a larger percentage in the other counties (up to about 15 percent in Lake and nearly 18 percent of employment in Harney). Despite its history as a critical economic driver, mining contributes relatively little employment in any county today, accounting for as little as 0.3 percent of jobs in Harney County, up to about 1.5 percent of jobs in Grant County (note that the data source does not release employment in four of the counties to protect business confidentiality). There is no clear correspondence between the sectors provided and recreation-related economic activity, but retail trade, accommodation, food services and arts, entertainment, and recreation sectors are relatively consistent contributors across all counties (note that these sectors are influenced by recreation but also by many other industries).

With respect to personal earnings, the services related sector accounted for the largest share (44.9 percent) of labor income in the Socioeconomic Study Area in 2010, followed by the government sector (31.7 percent) and the non-services related sector (20.8 percent). In 2010, the individual industries that generated the largest shares of personal earnings included the local government industry (14.0 percent); the healthcare and social services industry (10.7 percent); and the manufacturing industry (9.1 percent). Management of companies and enterprises, along with wholesale trade, showed a strong trend of growth since 2001 (a percent change of 154.9 percent and 99.0 percent, respectively); these were the two highest growth rates between 2001 and 2010. During the same time period, the forestry, fishing, and related activities industry experienced a 52.5 percent decline, the greatest decline of all the industry sectors.

Appendix P, Detailed Employment and Earnings Data, provides county-level labor earnings figures. The county-by-county patterns are similar to those for employment, with relatively more variation in farm-related income; farming contributes the most to earnings in Lake and Malheur Counties at 10.6 and 6.8

percent, respectively. Earnings from the mining sector are left undisclosed in all but one county due to confidentiality requirements. Only Crook County reports earnings data for the mining industry and its figure is small (0.2 percent). Retail trade, accommodation and food services, and the "arts, entertainment and recreation" sectors, which are influenced in part by recreation and travel, are relatively consistent contributors across all counties.

Supplementing the data on industry shares of labor earnings is another metric – residence adjustment. Residence adjustment represents the net inflow of the earnings of inter-area commuters. A positive number indicates that, on balance, area residents commute outside to find jobs; a negative number indicates that, on balance, people from outside the area commute in to find jobs. Grant County's residence adjustment represented 1.5 percent of its total personal income, the highest share of all counties in the Socioeconomic Study Area. Baker County had the second highest share (1.4 percent). Residence adjustment accounted for the lowest share of total personal income in Malheur County (negative 15 percent, presumably in large part because of the Snake River Correctional Institution), followed by Lake County (negative 0.5 percent). See **Appendix P**, Detailed Employment and Earnings Data, for detailed county data.

In addition to the seven counties of the primary Socioeconomic Study Area, **Appendix P**, Detailed Employment and Earnings Data, provides employment and earnings data for Deschutes County, which constitutes a secondary analysis area as documented in the introduction. Overall employment and earnings in Deschutes County are approximately 1.5 times that of the 7 counties in the primary Study Area. The economy of Deschutes County is broadly diversified, although with a significant contribution from the healthcare and social assistance and retail trade industries. The impact analysis in the next chapter will document potential effects on Deschutes County's economy, as well as for the seven counties of the primary Socioeconomic Study Area.

Table 3-59, Unemployment, 2007 - 2012, presents the unemployment rates for each county in the Socioeconomic Study Area, as well as the rates for the seven counties aggregated and the State of Oregon. The data show that the Socioeconomic Study Area has experienced higher rates of unemployment than the State for each of the years listed. In September 2012 (the most recent date for which data are available as of this writing), the Study Area recorded an unemployment rate of 8.7 percent, compared to the State rate of 7.6 percent. At the county level, the unemployment rate ranged from a low of 7.5 percent in Union County to a high of 11.3 percent in Crook County. Unemployment in these counties could be more significant than these numbers suggest because many workers employed in part-time, seasonal, or transitional employment (Hanus 2011).

Table 3-59
Unemployment, 2007 - 2012

Geographic Area	2007	2008	2009	2010	2011	September 2012
Baker County, OR	5.8%	7.1%	10.2%	10.0%	10.4%	7.8%
Crook County, OR	6.2%	9.9%	17.8%	16.9%	14.8%	11.3%
Grant County, OR	8.1%	10.5%	13.4%	13.4%	13.4%	9.8%
Harney County, OR	7.3%	9.5%	16.0%	15.5%	14.4%	9.6%
Lake County, OR	7.3%	8.6%	12.4%	13.5%	12.9%	9.8%
Malheur County, OR	5.6%	7.5%	10.7%	10.5%	10.1%	7.8%
Union County, OR	5.5%	8.0%	11.4%	10.4%	9.8%	7.5%
Socioeconomic Study Area	6.1%	8.4%	12.7%	12.2%	11.5%	8.7%
Oregon	5.2%	6.5%	11.1%	10.7%	9.5%	7.6%

Source: BLS 2012b

During approximately the same period (2007-2011), per capita income in the Socioeconomic Study Area was somewhat below that of the State of Oregon, ranging from $27.5 thousand (2007) to $30.3 thousand (2011) for the Socioeconomic Study Area as a whole. This compared to between $35.6 thousand to $37.7 thousand for the State of Oregon. Per capita income was lowest in Malheur County and highest in Baker County, but in all counties in the Socioeconomic Study Area, it was lower than that of the State of Oregon (U.S. Department of Commerce 2012a).

Recreation

Approximately 4,806 jobs (17.6 percent of all private sector jobs in 2010) in the Socioeconomic Study Area are related to travel and tourism (Headwaters Economics 2012). This estimate is based on data from the US Census Bureau County Business Patterns and includes industrial sectors that, at least in part, provide goods and services to visitors to the local economy and to the local population. It includes both full- and part-time jobs. Most of these jobs are concentrated in the "accommodation and food services" and "retail trade" sectors. The Socioeconomic Study Area's proportion of travel and tourism-related jobs was 2.5 percentage points higher than the national average of 15.1 percent in 2010. Jobs related to travel and tourism are more likely to be seasonal or part-time and more likely to have lower average annual earnings than jobs in non-travel and tourism-related sectors. The average annual wage per travel or tourism related job was $13,277 (2010 dollars) in the Socioeconomic Study Area in 2011, compared to $28,214 for private sector jobs not related to travel and tourism (Headwaters Economics 2012). [2]

Although much of the recreation use on BLM-administered lands is dispersed, and far from counting devices such as trail registers, fee stations, or vehicle

[2] All dollar values were converted to 2010 dollars using the Consumer Price Index (BLS 2012a).

traffic counters, approximations of the number of visitors to BLM-administered lands can be obtained from the BLM Recreation Management Information System (RMIS) database, in which BLM recreation specialists provide estimated total visits and visitor days to various sites within their resource area's boundaries.[3] **Table 3-60**, Visits by Resource Area, FY 2011, summarizes BLM visitation data in each resource area for fiscal year (FY) 2011 (i.e., the year ending September 30, 2011).

Table 3-60
Visits by Resource Area, FY 2011

Resource Area	Number of Visits
Andrews	74,107
Baker	257,210
Central Oregon	103,744
Jordan	241,613
Lakeview	188,900
Malheur	153,440
Steens Mountain CMPA	239,740
Three Rivers	170,758
Total	2,062,201

Source: BLM 2012p
CMPA Cooperative Management and Protection Area

Visitor expenditures can be approximated by using the RMIS data in conjunction with data from Forest Service, which has constructed recreation visitor spending profiles based on years of survey data gathered through the National Visitor Use Monitoring program. Although the data are collected from National Forest visitors, the analysis that follows is based on the National Visitor Use Monitoring program profiles because the BLM has no analogous database. The profiles break down recreation spending by type of activity, day use versus overnight use, local versus non-local visitors, and "non-primary" visits (i.e., incidental visits where the primary purpose of the trip was other than visiting the National Forest being surveyed). **Table 3-61**, Visitor Spending from Recreation on BLM-Administered Land in Socioeconomic Study Area, FY 2011, summarizes individual and party visits and expenditures by trip type and estimated direct expenditure.

As the table shows, the estimated total visitor spending on BLM-administered lands in the Socioeconomic Study Area was about $144 million in FY11. It is important to note that this includes expenditures from local residents and

[3] In RMIS, a *visit* is defined as the entry of any person onto lands or related waters administered by the BLM for any time period. A same day reentry, negligible transit, and entry to another recreation site or detached portion of the management area on the same day are considered a single visit. RMIS defines a *visitor day* as equivalent to twelve visitor hours.

Table 3-61
Visitor Spending from Recreation on BLM-Administered Land in Socioeconomic Study Area, FY 2011

Trip Type	Percent of Visits[1]	Estimated Number of Individual Visits	Average Party Size[1]	Estimated Number of Party Visits	Party spending per visit (2010 $)[1]	Estimated direct expenditure ($ millions)
Non-local Day Trips	10	206,220	2.5	82,488	$63.68	$5.25
Non-local Overnight on Public Lands	9	185,598	2.6	71,384	$237.27	$16.94
Non-local Overnight off Public Lands	14	288,708	2.6	111,042	$522.63	$58.03
Local Day Trips	49	1,010,478	2.1	481,180	$33.56	$16.15
Local Overnight on Public Lands	4	82,488	2.6	31,726	$165.14	$5.24
Local Overnight off Public Lands	1	20,622	2.4	8,593	$216.48	$1.86
Non Primary Visits	13	268,086	2.5	107,234	$376.62	$40.39
Total	100	2,062,201	NA	893,647	NA	$144

Sources: White and Gooding 2012; BLS 2012a; BLM 2012n
NA: Not Applicable
1. National average for all National Forests, from White and Goodding (2012). Party spending per visit is converted from 2009 to 2010 dollars using the Consumer Price Index (BLS 2012a).

visitors whose use of public lands was incidental to some other primary purpose. The greatest portion of visitor spending came from overnight visits off of public land by non-local visitors ($58.03 million). The second largest portion of visitor spending came from non-primary visits ($40.39 million). Overnight visits off of BLM-administered land by local visitors made up the smallest portion of visitor spending ($1.86 million).

Grazing

Ranches in the study area include large corporate ranches and family ranches. Family ranches include both corporate and non-corporate operations, with the

distinction referring to the fact that some families have legally incorporated to facilitate passage of the operations to their heirs. Farming employed approximately 6,769 people in the Socioeconomic Study Area in 2010, accounting for 10.9 percent of total employment. The average annual wage for a farm job in the Study Area was $23,562 in 2011. This was slightly lower than the average annual wage for a non-farm job ($25,021; Headwaters Economics 2012).[4]

Table 3-62, Farm Earnings Detail, 2010 (2010 dollars), presents the proportion of personal income originating from farm earnings and the farm cash receipts from livestock received throughout the Socioeconomic Study Area and Oregon as a whole.

Table 3-62
Farm Earnings Detail, 2010 (2010 dollars)

Geographic Area	Farm Earnings as Share of All Earnings	Agriculture and Forestry Support Activities Earnings as Share of All Earnings[1]	Farm Cash Receipts (Millions)	Share of Farm Cash Receipts from Livestock	Share of Farm Cash Receipts from Crops
Baker County, OR	0.8%	0.8%	$57.4	57.4%	42.6%
Crook County, OR	-2.5%	1.2%	$30.1	60.5%	39.5%
Grant County, OR	-0.1%	(D)[2]	$16.6	83.6%	16.4%
Harney County, OR	5.3%	(D)	$50.5	60.0%	40.0%
Lake County, OR	10.6%	(D)	$75.9	45.9%	54.1%
Malheur County, OR	6.8%	2.6%	$307.7	56.5%	43.5%
Union County, OR	3.4%	1.6%	$60.3	24.9%	75.1%
Socioeconomic Study Area	3.5%	1.4%	$598.5	53.3%	46.7%
Oregon	1.2%	0.4%	$4,039.1	33.3%	66.7%

Source: US Department of Commerce 2012a
[1]This division is the finest resolution of data provided by the US Department of Commerce's Bureau of Economic Analysis that includes agricultural services.
[2](D) indicates that the value is not shown to avoid disclosure of confidential information.

The table shows that, as noted earlier in this section, the relative contribution of farm earnings varies substantially across the counties, forming the largest share in Lake, Malheur, and Harney Counties. Agricultural services is an important contribution in several counties, although in some counties the data

[4] All dollar values were converted to 2010 dollars using the Consumer Price Index (BLS 2012a).

are not released for confidentiality reasons. Both livestock and crops provide substantial cash receipts, with some variations across the counties (e.g., livestock contributes 84 percent of receipts in Grant County while crops contribute 75 percent in Union County). Compared with the state as a whole, the share of farm cash receipts originating from livestock in the Socioeconomic Study Area was 20 percentage points higher.

Table 3-63, Active and Billed Animal Unit Months (AUMs) on BLM-Administered Land, presents information on active and billed AUMs in the Socioeconomic Study Area, on BLM-administered land within each Resource Area. The estimated expenditure data in the table are calculated from data from the US Department of Agriculture Economic Research Service (ERS), which publishes annual budgets for cow-calf operations for different production regions across the country (USDA ERS 2012). The BLM calculated a ten-year inflation-adjusted average expenditure per cow-calf operation from the ERS budgets, then converted that information to a per-AUM figure based on average forage requirements for a cow including other livestock (e.g., bulls and replacement heifers) that are needed to support the production from the cow (Workman 1986). Based on these calculations, the BLM estimates that the 10-year average expenditure in southeast Oregon is $50.24 per AUM, which is reflected in **Table 3-63**.

Table 3-63
Active and Billed Animal Unit Months on BLM-Administered Land

Resource Area	Active (2011)	% Billed (2011)	Billed (2011)	Cattle (%)	Sheep (%)	Other (%)	Allot-ments	Acres per AUM	Estimated direct expenditures (millions)
Andrews	66,237	65%	43,076	100%	0%	0%	43	17.4	$3.3
Baker	47,316	89%	42,133	99%	1%	0%	355	8.4	$2.4
Central Oregon	61,655	69%	42,685	98%	2%	0%	281	14.3	$3.1
Deschutes	55,465	50%	27,991	99%	0%	1%	170	12.5	$2.8
Jordan	187,016	84%	157,095	100%	0%	0%	50	13.6	$9.4
Lakeview	163,969	67%	109,159	100%	0%	0%	116	17.9	$8.2
Malheur	233,566	81%	189,316	98%	2%	0%	119	8.9	$11.7
Steens Mountain CMPA	29,682	64%	19,004	100%	0%	0%	21	11.6	$1.5
Three Rivers	154,013	74%	114,421	100%	0%	0%	186	10.9	$7.7
Total	998,919	75%	744,880	99%	1%	0%	1,341	12.7	$50.8

Sources: BLM 2012o; USDA ERS 2012; Workman 1986
CMPA Cooperative Management and Protection Area

The data in the table help to demonstrate the importance of livestock grazing, and especially cattle ranching, within the Socioeconomic Study Area, particularly

in the Malheur, Jordan, Lakeview, and Three Rivers Resource Areas. It is important to remember, as well, that the data are only for forage values on BLM-administered land; forage on other public lands, and private lands, contribute additional values to the Socioeconomic Study Area.

Forestry and Wood Products

Timber-related industries in the Socioeconomic Study Area employed approximately 1,600 people in 2010, approximately 5.9 percent of total private sector employment, according to the US Census Bureau County Business Patterns. The proportion of employment associated with timber-related industries varied by county, with a low of 0 percent in Malheur County and a high of 17 percent in Crook County. These estimates include both full- and part-time jobs and reflect three timber-related industries: growing and harvesting, sawmills and paper mills, and wood products manufacturing. The share of timber-related jobs in the Socioeconomic Study Area, though historically low for the region, remains over eight times the national average of 0.7 percent (Headwaters Economics 2012).

Average annual earnings for timber-related jobs tend to be higher than for non-timber jobs. The average annual wage per job in this sector was $33,777 (2010 dollars) in the Socioeconomic Study Area in 2011, compared to $24,484 for non-timber private sector jobs.[5]

Renewable Energy Resources

Wind and geothermal energy are the focus of renewable energy development on BLM-administered lands in Oregon. There is one active wind farm on BLM lands in Oregon, located in the Baker Resource Area of the Vale District (BLM 2009a). The Baker Field Office also has one pending wind development project applications, five pending wind energy testing and monitoring applications, and one authorized ROW for wind testing and monitoring, as of 2011 (BLM 2011c, BLM 2013e).

The Andrews Management Unit and the Steens Mountain Cooperative Management and Protection Area (Andrews-Steens Planning Area) of the Burns District also have moderate wind energy resource potential (BLM 2004b). Wind developers have conducted testing and have found that there is enough wind to make projects viable in the area. Harney County has approved a wind farm on private land in the Steens area and BLM approved a powerline ROW to the private land. This action is currently under litigation. In the past BLM Burns District had as many as seven potentially viable wind sites. All but two of these sites have been relinquished. Three of the five relinquished sites had sage-grouse as a major conflict. On the two remaining sites, one developer has submitted an application for development. On the other site, the developer has submitted

[5] All dollar values were converted to 2010 dollars using the Consumer Price Index (BLS 2012a).

notice to BLM that they intend to move forward to development (BLM 2013e). There are four potential testing sites on non-BLM lands in the area.

The Lakeview Resource Area of the Lakeview District also has areas with potential for wind farm development (e.g., Christmas Valley, Coyote and Rabbit Hills, South Warner Rim; BLM 2003a). Two authorizations for wind testing have been approved (BLM 2013e).

Prineville District has one authorization in the testing phase (BLM 2013e).

As discussed in **Section 3.11**, Mineral Resources, the 2008 Geothermal Programmatic EIS identifies all of the socioeconomic study area as having potential for geothermal resources. The Malheur and Jordan Resource Areas of the Vale District have a large geothermal resource base, which includes the Vale Known Geothermal Resource Area (BLM 2001). However, according to the Office of Natural Resources Revenue, there has been no production of federal geothermal resources since at least 2007 (ONRR 2012).

Although wind and geothermal energy are the primary types of renewable energy development in Oregon, the potential for solar energy development also exists. The Lakeview Resource Area receives moderate to moderately-high solar radiation (BLM 2003a).

There is growing interest in biomass as a renewable energy source in the Socioeconomic Study Area (ODOE 2012). Where demand for woody biomass exists, local economies benefit from removing and utilizing woody biomass byproducts. These byproducts result from treatments such as those to restore sage-grouse habitat. Because the communities and businesses surrounding the juniper manufacturing economy are small, utilization projects can have considerable impacts on employment even at a small scale.

The Oregon Governor recently endorsed a new Oregon State Biomass Utilization Strategy that specifically identifies the need to increase juniper utilization in eastern Oregon. Additionally, the Governor designated an Oregon Solutions project called the Western Juniper Utilization Group that is currently addressing the gap between restoration treatments ongoing and planned in eastern Oregon and how to build a woody biomass-based restoration economy around this theme. This group is working with the Sagegrouse Conservation Partnership Group (SAGECON) so their outcomes can be aligned (Oregon State Government 2012).

Mining and Minerals

Mineral production is a relatively minor contributor to the economy of the Socioeconomic Study Area. Within the 7 counties, mining industries employed 103 people in 2010, or approximately 0.4 percent of total private sector employment (Headwaters Economics 2012). These estimates are based on data from the US Census Bureau County Business Patterns, which includes both full-

and part-time jobs. Mining industries include "oil and gas extraction," "coal mining," "metals mining," "nonmetallic minerals mining," and "mining related" industries. The share of mining jobs in the Socioeconomic Study Area (0.4 percent) was slightly lower than the national average of 0.5 percent. However, the average annual earnings per mining-related job are approximately equal to non-mining private sector jobs. The average annual wage per job in this sector was $27,801 (2010 dollars) in the Socioeconomic Study Area in 2011, compared to $27,775 for non-mining private sector jobs (Headwaters Economics 2012).

There is currently no oil, gas, or coal production in the study area. Locatable minerals of commercial interest include diatomaceous earth, limestone, perlite, sunstone, bentonite, and gold. Table 3-46 of Section 3.11, Mineral Resources, shows claims, plans of operations and notices for locatable minerals in the planning area. Salable minerals are potentially present throughout the study area and include clay, cinders, sand and gravel, crushable rock, and common variety facing stone (Section 3.11, Mineral Resources).

Other Values

BLM-administered lands provide a range of goods and services that benefit society in a variety of ways. Some of these goods and services, such as timber and minerals, are bought and sold in markets, and hence have a readily observed economic value (as documented in the sections above); others have a less clear connection to market activity, even though society derives benefits from them. In some cases, goods and services have both a market and a non-market component value to society. This section provides an overview of several non-market values described through a qualitative and quantitative economic valuation analysis.

The non-market values associated with BLM-administered lands can be classified as values that derive from direct or indirect use (e.g., recreation) and those that do not derive from use, such as existence values held by the general public from self-sustaining populations of sage-grouse. This section and the related appendix describe the use and non-use non-market economic values associated with recreation, populations of sage-grouse, and land that is currently used for livestock grazing and ranch operations. The sections that follow discuss each of these values in turn. **Appendix Q**, Non-Market Valuation Methods, provides more discussion of the concepts and measurement of use and non-use non-market values. It is important to note that these non-market values are not directly comparable to previous sections that describe output (sales or expenditures) and jobs associated with various resource uses on BLM-administered lands. Those indicators describe the effects on the region but do not represent net economic value and cannot be added to the non-market values discussed here. Additional discussion is provided in **Appendix Q**, Non-Market Valuation Methods.

Values associated with recreation

Actions that promote the conservation of sage-grouse habitat may result in changes in recreation activity, by changing opportunities or access for different recreational activities. Opportunities for some activities such as wildlife viewing may increase as the amount of habitat may increase for species that depend on BLM-administered lands, including sage-grouse. The Environmental Consequences analysis (Chapter 4) addresses this issue for each of the management alternatives. This section documents baseline non-market values visitors receive associated with recreation activities. This is measured by what economists call consumer surplus, which refers to the additional value that visitors receive over and above the price they pay. **Appendix Q**, Non-Market Valuation Methods, provides an explanation of consumer surplus. Fees to use public lands for recreation are typically very low or non-existent, so the value people place on public land recreation opportunities is not fully measured simply by the entrance fees people pay.

Economists estimate the consumer surplus from recreation by measuring how the variation in visitors' travel costs corresponds to the number of visits taken. This "travel cost method" has been developed extensively in academic literature and is used by federal agencies in economic analyses. Conducting original travel cost method studies can be time-consuming and expensive; for this project BLM relied on estimates of consumer surplus from prior recreation studies in the same geographic region, using an established scientific method called benefit transfer. Based on the studies reviewed and cited in **Appendix Q**, Non-Market Valuation Methods, visitors to natural areas, such as BLM-administered lands, gain values (in excess of their direct trip cost) ranging from approximately $26 per day for picnicking, to about $90 per day for hunting.

To calculate the aggregate "consumer surplus" value of recreation in the study area, the BLM multiplied this per-day value of recreation by the estimated number of visitor days associated with each activity type. Visitation estimates by activity are derived based on the BLM Recreation Management Information System (RMIS) database for the resource areas within the study area.

Accounting for the value per day and the number of days, the total non-market value of recreation on BLM-administered lands in the study area was estimated to be about $144 million per year. Based on the quantity of recreational trips and the economic value of each type of activity, the largest annual non-market values are associated with camping, hunting, fishing, and the use of OHVs. These categories omit downhill skiing, because there is little or no overlap between sage-grouse habitat and lands used for downhill skiing.

Values associated with populations of sage-grouse

The existence and perseverance of the Endangered Species Act and similar acts reflects the values held by the American public associated with preventing species from going extinct. Economists have long recognized that rare,

threatened and endangered species have economic values beyond those associated with active "use" through viewing. This is supported by legal decisions and technical analysis (see **Appendix Q**, Non-Market Valuation Methods, for details), as well as a number of conceptual and empirical publications that refine concepts and develop methods to measure these non-use or existence values.

The dominant method uses surveys to construct or simulate a market or referendum for protection of areas of habitat, or changes in populations of species. The survey asks the respondent to indicate whether they would pay for an increment of protection, and if so how much they would pay. Economists have developed increasingly sophisticated survey methods for non-use value over the last two decades to improve the accuracy of this method. **Appendix Q**, Non-Market Valuation Methods, offers an in-depth discussion of this method of value estimation.

Original surveys to estimate non-use values are complex and time-consuming; rather than perform a new survey, the BLM reviewed existing literature to determine if there were existing non-use value studies for sage-grouse. No existing studies on valuation specific to the sage-grouse were found. However, there are several studies published in peer-reviewed scientific journals for bird species that the BLM judged to have characteristics similar to sage-grouse, including being a candidate for listing as threatened or endangered and being a hunted species. These studies find average stated willingness to pay of between $15 and $58 per household per year in order to restore a self-sustaining population or prevent regional extinction (see **Appendix Q**, Non-Market Valuation Methods, for details). These values represent a mix of use and non-use values, but the non-use components of value are likely to be the majority share, since the studies primarily address species that are not hunted. Since sage-grouse protection is a public good available to all households throughout the intermountain west, if similar per-household values apply to the species the aggregate regional existence value could be substantial.

Values associated with grazing land

Public land managed for livestock grazing provides both market values (e.g., forage for livestock) and non-market values, including open space and western ranch scenery, which provide value to some residents and outside visitors, and may also provide some value to the non-using public (e.g., the cultural icon of the American cowboy). Many people who ranch for a living or who otherwise choose to live on ranches value the ranching lifestyle in excess of the income generated by the ranching operations. This could be seen as a non-market value associated with livestock grazing. On the other hand, some residents and visitors perceive non-market opportunity costs associated with livestock grazing. Although some scholars and policy makers have discussed non-market values associated with livestock grazing, the process for incorporating these

values into analyses of net public benefits remains uncertain, and the BLM did not attempt to quantify these values for the present study.

Furthermore, some of the lifestyle value of ranching is likely to be captured in markets, such as through the property values of ranches adjacent to public lands with historic leases or permits for grazing on public land. Economists typically use a method called the hedonic price method to estimate values associated with particular amenities; this method may be used to explain the factors that influence the observed sale prices of ranch land. **Appendix Q,** Non-Market Valuation Methods, provides more information about this method, as well as additional information to address potential non-market values associated with grazing.

Fiscal

Oregon has no state sales or use tax; the state government is funded primarily through personal and corporate income taxes, as well as other sources such as a state lodging tax. Local governments and special districts such as school districts rely primarily on property taxes; some local governments also charge lodging taxes (Oregon Department of Revenue 2010, 2012a, 2012b).

A 2012 audit report by the Oregon Secretary of State reviewed the financial condition of Oregon's 36 counties. Several counties in the state were facing financial hardship following the recent recession, given declines in important local revenues since 2008, such as property taxes and intergovernmental transfers. The report identified eight counties in particular risk of distress, none of them being in the Socioeconomic Study Area for this EIS. Counties at higher risk were often those more dependent on federal timber payments, scheduled to end, and not a major source of revenues for the counties in the Socioeconomic Study Area (Oregon Secretary of State 2012).

The primary local government revenues that are directly linked to BLM-administered lands are Payments in Lieu of Taxes (PILT), which are federal government payments based on the presence of all federal lands (not just BLM-administered lands) within each county. **Table 3-64**, Payments in Lieu of Taxes (PILT) Received in the Socioeconomic Study Area by County, 2010, shows the PILT payments each county received in 2010. The non-taxable status of federal lands is of interest to local governments, which must provide public safety and other services to county residents. The BLM revenue-sharing programs provide resources to local governments in lieu of property taxes because local governments cannot tax federally administered lands the way they would if the land were privately owned. Among counties in the Socioeconomic Study Area, PILT tends to be largest in Malheur County, where it was 12.5 percent of total revenues in FY2012 (Malheur County 2012).

Other revenues linked to public lands include timber receipts, livestock grazing fees, rent for mineral and geothermal leases, rents for ROW grants, and fees for

Table 3-64
Payments in Lieu of Taxes (PILT) Received in the Socioeconomic Study Area by County, 2010

Geographic Area	PILT (thousands)
Baker County	$700
Crook County	$310
Grant County	$578
Harney County	$995
Lake County	$995
Malheur County	$2,315
Union County	$822
Socioeconomic Study Area	$6,715

Source: DOI 2012
Includes payments received from BLM, Forest Service, Bureau of Reclamation, National Park Service, and Fish and Wildlife Service.

recreation permits. Some of these revenues collected by the federal government are returned to the state of origin.

BLM Expenditures and Employment

BLM offices provide a direct contribution to the economy of the local and surrounding area. BLM operations and management make direct contributions to area economic activity by employing people who reside within the area and by spending on project related goods and services. Contracts for facilities maintenance, shuttling vehicles, and projects contribute directly to the area economy and social stability as well. **Table 3-65**, BLM Employment and Related Expenditures in the Socioeconomic Study Area, FY2011, provides available information on the number of employees at each District office. It also presents the contributions to the local economy, in terms of labor income, resulting from BLM operations and management expenditures.

Table 3-65
BLM Employment and Related Expenditures in the Socioeconomic Study Area, FY2011

Agency	District Office	Management Unit[1]	BLM Expenditures (FY2011 labor income, $thousand)	Number of Staff (in FY2011 FTEs)
BLM	Burns	Andrews	$1,627	115
		Three Rivers	$6,499	
BLM	Lakeview	Lakeview	$6,373	96.5
BLM	Prineville	Central Oregon	$1,519	81.3
BLM	Vale	Baker	$2,428	169
		Malheur-Jordan	$9,457	

Sources: BLM 2012r
[1] Including Burns, Prineville and Vale District Offices, the Steens Mountain Cooperative Management and Protection Area, the Vale National Historic Oregon Trail and the Vale Snake River Program.

Environmental Justice

Environmental justice pertains to the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the adverse environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies (BLM 2005d). The BLM incorporates environmental justice into its planning process, both as a consideration in the environmental effects analysis and by ensuring a meaningful role in the decision-making process for minority and low-income populations.

Executive Order 12898 requires federal agencies to "identify and address the disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." The BLM Land Use Planning Handbook (BLM 2005d) reiterates the BLM's commitment to environmental justice, both in providing meaningful opportunities for low-income, minority, and tribal populations to participate in decision-making, and to identify and minimize any disproportionately high or adverse impacts on these populations.

According to the Council on Environmental Quality Environmental Justice Guidance Under the NEPA (CEQ 1997), "minority populations should be identified where either: (a) the minority population of the affected region exceeds 50 percent or (b) the minority population percentage of the affected region is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis." The same document states that "In identifying low-income populations, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect."

Additionally, the same guidance (CEQ 1997) advises that:

> In order to determine whether a proposed action is likely to have disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, or Indian tribes, agencies should identify a geographic scale, obtain demographic information on the potential impact area, and determine if there is a disproportionately high and adverse effect to these populations. Agencies may use demographic data available from the Bureau of the Census to identify the composition of the potentially affected population. Geographic distribution by race, ethnicity, and income, as well as a delineation of tribal lands and resources, should be examined.

Minority Populations

Table 3-66, Population Race and Ethnicity, 2010, summarizes the percentage of the population made up of ethnic minority groups in each county of the Socioeconomic Study Area and in Oregon and the United States as a whole.

Table 3-66
Population Race and Ethnicity, 2010

Geographic Area	Total Population	Percentage of Total Population								
		White	Black or African American	Alaska Native or American Indian	Asian	Native Hawaiian & Other Pacific Islander	Other Race	Two or More Races	Hispanic or Latino[1]	Total Minorities[2]
Baker County, OR	16,134	94.6	0.4	1.1	0.5	0.1	1.0	2.4	3.3	7.4
Crook County, OR	20,978	92.7	0.2	1.4	0.5	0.1	3.2	2.0	7.0	10.6
Grant County, OR	7,445	95.0	0.2	1.2	0.3	0.1	0.9	2.3	2.8	6.6
Harney County, OR	7,422	91.9	0.3	3.1	0.5	0.0	1.3	3.0	4.0	10.4
Lake County, OR	7,895	90.3	0.5	2.1	0.7	0.1	3.1	3.3	6.9	13.0
Malheur County, OR	31,313	77.5	1.2	1.2	1.7	0.1	15.5	2.9	31.5	36.4
Union County, OR	25,748	93.1	0.5	1.1	0.8	0.9	1.3	2.3	3.9	9.0
Socioeconomic Study Area	116,935	88.9	0.6	1.4	0.9	0.3	5.5	2.5	11.9	16.6
Oregon	3,831,074	83.6	1.8	1.4	3.7	0.3	5.3	3.8	11.7	21.3
United States	308,745,538	72.4	12.6	0.9	4.8	0.2	6.2	2.9	16.3	36.0

Source: US Census Bureau 2010b

[1] Individuals who identify themselves as Hispanic or Latino might be of any race; the sum of the other percentages under the "Percent of Total Population" columns plus the "Hispanic or Latino" column therefore does not equal 100 percent, and the sum of the percentages for each racial and ethnic category does not equal the percentage of "total minorities".

[2] The total minority population, for the purposes of this analysis, is the total population for the geographic unit analyzed minus the non-Latino /Hispanic white population.

With the exception of Malheur County, all counties within the Socioeconomic Study Area have a lower minority population by percentage than Oregon or the United States as a whole. The dominant minority group in Malheur County is the Hispanic/Latino population, which makes up approximately 32 percent of the county's population. Also of note, Harney County has an Alaska Native or American Indian population that makes up approximately 3 percent of the county's population, which is two times as large as the percentage across Oregon as a whole.

Low-income Populations

Table 3-67, Low-Income Populations, 2006-2010 Average, summarizes the percentage of the population below poverty level in each county of the Socioeconomic Study Area and in Oregon and the United States as a whole.

Table 3-67
Low-Income Populations, 2006-2010 Average

Geographic Area	Percent Population Below Poverty Level
Baker County	19.9
Crook County	14.0
Grant County	14.4
Harney County	18.5
Lake County	17.5
Malheur County	22.7
Union County	16.1
Socioeconomic Study Area	18.2
Oregon	14.0
United States	13.8

Source: US Census Bureau 2010c

Following the Office of Management and Budget's Directive 14, the Census Bureau uses a set of money income thresholds that vary by family size and composition to detect what part of the population is considered to be in poverty (US Census Bureau 2012).

Of the 7 counties in the Socioeconomic Study Area, all but 1 have a greater percentage of residents below the poverty level than the overall Oregon percentage (14 percent). Crook County (14 percent) has the same percentage of residents below the poverty level as Oregon as a whole. Malheur County (22.7 percent) has the highest percentage of residents below the poverty level. The percentage of Baker County (19.9 percent) and Harney County (18.5 percent) residents below the poverty level are also substantially higher than Oregon as a whole.

To ascertain whether there are disproportionate effects of the alternatives on low-income populations, data on effects by each alternative will be reviewed and reported in Chapter 4.

Tribal Populations

There are 10 federally recognized Indian tribes in the State of Oregon: Burns Paiute Tribe; Confederated Tribes of the Warm Springs Reservation; Confederated Tribes of Coos, Lower Umpqua, and Siuslaw; Confederated Tribes of Grand Ronde; Confederated Tribes of Siletz; Confederated Tribes of Umatilla; Coquille Indian Tribe; Cow Creek Band of Umpqua Indians; Klamath Tribes; and Fort McDermitt Paiute and Shoshone Tribes of the Fort McDermitt

Indian Reservation (NCSL 2013). The Burns Paiute Reservation is located in Harney County (Burns Paiute Tribe 2012) and the Fort McDermitt Indian Reservation is located in the south of Malheur County (and Nevada). Tribes with traditional interests that lack ratified treaties within the Socioeconomic Study Area include the Confederated Tribes of the Warm Springs Reservation (BLM 2011c) and the Klamath Tribes (BLM 2003a). Traditional interests include fishing for resident and anadromous fish species, hunting large and small game, and gathering natural resources for subsistence and cultural purposes. Potential environmental justice impacts on the two tribes present in the Socioeconomic Study Area (Burns Paiute and Fort McDemitt Paiute and Shoshone) and the two tribes with traditional interests in the Socioeconomic Study Area (Confederate Tribes of the Warm Spings Reservation and Klamath Tribes) will be assessed in Chapter 4.

3.21 CULTURAL RESOURCES AND TRIBAL INTERESTS

Cultural resources consist of the locations of human activity, occupation or use. The term "cultural resources" has been adopted and widely used to refer to a number of diverse site types, structures, objects and places created and used by people. The term includes "historic properties," which are places of traditional cultural and/or religious importance to Indian tribes as defined in the National Historic Preservation Act of 1966, "archaeological resources" as defined in the Archaeological Resources Protection Act of 1979, and other sites, structures, objects and places created and/or used by human cultural groups but addressed in other statutes/regulations such as the Antiquities Act of 1906, the FLPMA, the NEPA, and the National Trails System Act of 1968.

Cultural resources represent the full temporal range of human occupation and use from the continent's first peoples' arrival and settlement in Oregon over 14,000 years ago and subsequent tribal groups expansion and use throughout all of the Oregon sub-region and other parts of the west to more recent fur trappers, homesteaders, miners and ranchers of the last 200 years. Cultural resources can include buried artifacts and cultural features made and left by human cultures in archaeological sites; items built by past cultures (e.g., houses/house remains and activity areas); and places associated with traditional cultural uses (e.g., collection of native plant foods). More specific information on the types and characteristics of cultural resources in the Oregon sub-region can be found in the following sections.

Cultural resources are identified through field inventory, historic documentation, oral evidence or a combination of these methods. Where there is federal agency involvement, cultural resources are most frequently identified through compliance with Section 106 of the National Historic Preservation Act and related consultation with Indian tribes, the Oregon State Historic Preservation Office and other Section 106 parties. Section 106 requires that federally funded, approved, authorized, licensed, permitted, or assisted actions

consider potential effects to historic properties that could occur due to the proposed actions.

Prior to initiating proposed actions for protection and enhancement of sage-grouse and sage-grouse habitat, the responsible field manager shall determine the area of potential effect; review existing information on known/anticipated historic properties that could be affected; seek information (in accordance with environmental review and land use planning processes) from Native American tribes and other parties likely to have knowledge of or concern with historic properties (including places of traditional cultural or religious significance); determine the need for field surveys or other actions to identify historic properties; make a good faith effort to identify and evaluate historic properties; assess and determine effects to historic properties; and identify measures to avoid, lessen or mitigate adverse effects to historic properties.

As proposed future actions related to sage-grouse protection and sage-grouse habitat improvements are identified on a site specific basis, these projects will require compliance and consultation with the revised national Programmatic Agreement (including BLM's 8100 Manual procedures) and the Oregon BLM-Oregon State Historic Preservation Office protocol.

3.21.1 Existing Conditions

Conditions of the Planning Area

Prineville District manages lands along two major rivers (Deschutes and John Day) that are a part of the central Columbia River Basin. Burns District, though mostly in the Great Basin, manages lands in the Malheur River Basin that are connected to the Snake River Basin. The presence of such rivers in these districts afforded the prehistoric (and some modern) indigenous people anadromous fish, a significant resource.

The BLM districts contain forested lands from just east of the Cascade Mountains in the west to the wide-ranging Blue Mountains north and east. Not only did forests provide specific resources to indigenous people, but they also attracted Euro-American settlers to engage in logging and lumber milling operations.

Another aspect of this region in Oregon is the concentration of economically important edible plants in various areas on each district. Many were primary sources of sustenance to the prehistoric inhabitants of the region and are still visited today for the same cultural uses.

In summary, Prineville and Burns Districts have many resources in common to varying degrees and in specific locales. This unity is apparent in the archaeological record. However, the degree to which each of the resources is common on the two districts also makes the intra-regional archaeological record somewhat diverse.

A number of different cultural areas are subsumed in this region. It contains a large component of Desert Culture geography but also is concentrated along rivers in the Columbia Plateau cultural area. These cultural areas roughly correspond to distinctly different indigenous groups with different languages and moderately different resource-based economic systems and social structures. In each district there are living descendants of each of the indigenous groups that have organized themselves into modern Indian tribes such as the Klamath, Modoc, Warm Springs, Paiute, and Shoshone.

Conditions on BLM-Administered Lands

The area contains populations of economically important plant resources with certain species dominating the rest depending on the region and the particular preferences of Indian tribes or individuals. Many rocky upland flats are likely to support populations of plants such as bitterroot, biscuitroot, Indian carrot, and other important root plants. Modern traditional food plant gathering focuses almost entirely on root crops and wild fruits especially if they are found near the various reservations. Other types of cultural food plants such as seeds are not collected today to the degree they were collected in former times. Cultural plants for weaving appear to be collected wherever they are found. Medicinal cultural plants are undoubtedly collected today, but practitioners of indigenous healing arts may not share plant location information as readily as those collecting plants for sustenance and weaving.

Geographic high places, locations with panoramic views or specific geological formations on BLM-administrated lands, may have spiritual connotations to the various Native American tribes. These places were the location of specific ritual practices or the landforms themselves play a part in indigenous mythology and storytelling. Some examples include Placidia Butte and Iron Mountain on Burns District are specific landform types that are clearly demarked from the surrounding geography and speak to indigenous mythology and storytelling; Glass Buttes and Little Glass Butte and associated obsidian sources comprise a large area and are considered by the Klamath Tribes as sacred. These types of traditional sites can be the most difficult to describe and quantify because they are uses that may span thousands of years and be associated with geographic locations where the BLM intends to pursue other resource management practices.

Buried open sites are defined as archaeological deposits that demonstrate the presence of buried, intact stratigraphic layers. They can range in complexity from small campsites devoted to a few days occupation over a span of many years to small pithouse hamlets and large village-like aggregations such as Skull Creek Dunes on Burns District and pit house villages on the Deschutes and John Day Rivers of Prineville District encompassing tens of acres or more. Obviously, not all buried sites are equal but each because of its stratigraphic integrity has something to add to archaeological record because chronological information is preserved. Buried open sites are limited in the classes of artifact

that can be found within their deposits. Because they are subjected to annual wetting and drying, only artifacts made of stone and bone survive.

Buried open sites are likely to have received various destructive forces over the millennia. Natural geomorphic forces usually due to fluctuations in the climate regime have eroded some sites and buried others deeper over time. Other natural (and possibly cultural) phenomena such as wildfires periodically burned over these sites, exposing their surfaces to wind and water erosion before new vegetation could protect them. Modern activities such as road building, OHV, chaining and crested wheat grass seedings, juniper cutting and burning, logging, illegal artifact collection and looting, livestock and wild horse grazing, livestock reservoir construction, and spring developments have negatively impacted these sites to some degree. Any buried open sites within a few hundred yards of livestock congregation areas such as an open riparian area, spring development or playa lake waterhole is almost guaranteed to have been damaged and continue to be unless some mitigation measure is implemented to remove livestock from the site areas.

The most common site in the region is the prehistoric, shallowly buried or surface site. This site type accounts for 70 percent of the total number of sites. Shallowly buried sites are defined as those sites buried less than 40 centimeters deep. They can be as simple as a surface scatter of lithic debris from flint knapping to as complex as a seasonal camp with a diversity of artifact types. Many surface scatters are a mixture of different ages of materials eroded into one layer. As such, many mixed surface sites have limited information potential unless a researcher is willing to go to the effort and expense to unravel the chronological record. This unraveling can be done with aid of obsidian sourcing and hydration studies but will only be successful with an assemblage made of obsidian. Even if successful, the hydration data will only provide a relative chronology of the site, an inferior substitute for radiocarbon dating.

Shallowly buried sites are defined as those sites buried less than 40 centimeters deep. These sites rarely have obvious or intact stratigraphy mainly due to the winter conditions in the region. Many sites have a sediment matrix of with large proportions of clay particles. Any clay rich matrix swells and contracts with wetting and drying. In addition, moisture laden fine sediments expand when frozen and can be heaved vertically during the coldest part of the winter. These forces can destroy any intact stratigraphy and mix cultural materials in the upper 40 centimeters of the sediment matrix. The data found in multicomponent shallowly buried sites can then be well mixed and have limited data potential. Again, obsidian studies can unravel some of the damage caused by mixing but not without effort and expense probably not commensurate with the data retrieved. And again, the effort to unravel mixed cultural materials is limited to obsidian artifacts and debitage. As mentioned above, much of the region is rich in obsidian sources and the sites there are dominated by obsidian. Parts of the region (Columbia Plateau) not rich in obsidian are dominated by other lithic

materials such as cryptocrystalline silicates and basalt. Neither of these two stone types can be successfully dated either in a relative or absolute sense.

Juniper structures, wickiup-like residential structures constructed of juniper poles supported by juniper trees and limbs and covered in juniper bark, have been recorded in Prineville District. First discovered in the late 1960s using a notation in 19th century Government Land Office surveyor notes, they may be associated with late prehistoric and early historic refuges where indigenous people escaped from conflict with Euro-American settlers. Other than initial recording of these small hamlets, they have received little notice from researchers. They possibly contain information important to a period of rapid culture change. These structures have not been found in the juniper forests of Burns District.

Juniper structures are high priority for preservation and research due their fragile nature and their potential to yield information about culture change in the early to mid-19th century. They are often in areas where juniper management is a high priority. Close interval (20 meters) inventory is recommended for juniper control projects in the vicinity of known juniper structures in order to locate and protect this site type.

The region contains many different historic structures, most located on homestead claims that either were not proved up or restored to the Government Land Office after a number of years. Remnants of small mining camps or small farmsteads containing a cabin, out building(s) and possibly a corral for livestock are the most common type of historic structures. In many cases they are in poor condition and have low integrity. If integrity is low and structures are in ruin, their significance is low. However, if integrity is high their significance can be much greater if they are associated with important people, events or representative of an architectural style. In addition, they can be stabilized or restored to original condition in consultation with historic architects. Their National Register significance should be established prior to stabilization or restoration efforts. Historic structures with moderate to high integrity are high priority for stabilization and restoration (protection) if they are considered eligible for nomination to the National Register of Historic Places or they can contribute to heritage tourism or interpretation efforts.

Historic linear features include rock fences, trails, wagon roads, old highways and communication lines such as telegraph or old phone lines. These features, especially trails, wagon roads and old telegraph/phone lines, are liable to be associated with important people and events in history. Historic trails and wagon roads can be chronological extensions of previous travel routes used by indigenous people in ancient times. Old highways can be representative of early transportation systems funded and built under the supervision of the various counties and State of Oregon. Old telegraph and telephone lines were used to connect fire watch towers and ranger stations within the National Forest

System lands as well as to connect isolated settlements to one another. Some of these sites signify the pioneering attempts in the region to improve communication. Rock fences are generally some of the first fences built by early ranchers in the region. Though arduous to build, raw materials for their construction were close at hand and plentiful and they required very little maintenance. Later wire fences were more expensive to build but did not require the high level of labor to construct.

All of these features can be significant if associated with important events or people in history. However, most of their importance is due to their geographic location. Some linear sites such as trails and wagon roads can contain other features that make them suitable for preservation for heritage tourism and interpretation. These examples are high priority for preservation, protection and interpretation.

3.21.2 Trends

Trends related to cultural resources measure the rate of change to cultural resources over time. Essentially, trends track impacts that are effectively altering the integrity or physical condition of cultural resources, both beneficially and adversely. Although an important level-of-effect indicator, it is often difficult to estimate. Rate of change is normally assessed during or following project construction.

New cultural resource discoveries have a progressive trend towards more sites being recorded and logged into the Oregon State Historic Preservation Office's cultural resource database due to increases in actions permitted by federal agencies. In general, the higher frequency of federal undertakings done in an area leads to a higher number of cultural resources being found. This is a direct result of several federal laws requiring project proponents to inventory their project areas and avoid damaging eligible or National Register of Historic Places listed sites.

The trend generally seen for cultural resource condition in Oregon sage-grouse habitats is regressive, moving from a stable or preserved state to damage or destruction due to numerous reasons, including weathering, visitor exposure which could increase the likelihood of vandalism, and general "wear and tear." However, preservation measures are viewed as mitigation to this downward trend, allowing proponents to avoid (the ideal mitigation) or reduce impacts.

Over the past 100 years, annual temperature and precipitation have increased, and climate models predict that they will continue to increase through the 21st century (NCSL 2008). Climate changes that result in warmer temperatures and lower levels of precipitation. This facilitates the invasion of non-native species, could lead to increased erosion, and loss of vegetation cover. All of these factors can contribute to more threats to cultural resources including increased erosion rates, less protective vegetation cover, and intense, bigger, and more frequent wild fires. Based on the trend it is anticipated that as the effects of

climate change continue and increase, then the threat to cultural resources from climate change will also increase.

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